



CARNAUBA

PRODUCTION CHAIN
Good Practices Manual



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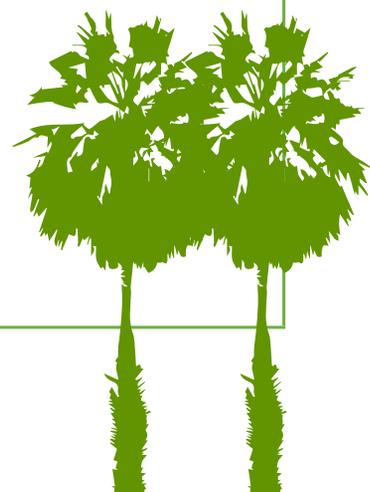
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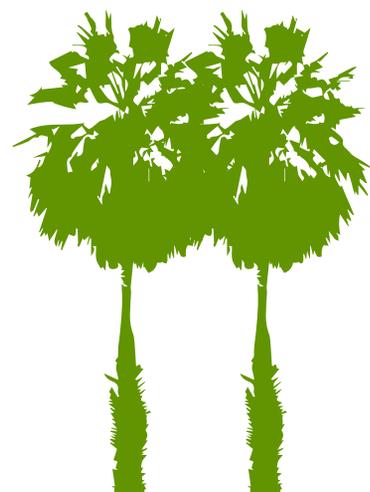
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Acronyms

ABNT - Brazilian Association of Technical Standards

ADECE - Ceará State Development Agency

ANVISA - National Health Surveillance Agency

CA - Certificate of Approval

CABI - International Center for Agricultural Bioscience

CAGED - General Register of Employed and Unemployed

CAR - Rural Environmental Registry

CLT - Consolidation of Labor Laws

COETRAE - State Commission for the Eradication of Slave Labor

CONAB - National Supply Company

CRECI-CE - Regional Council of Realtors

CTPS - Work and Social Security Card

DAP - PRONAF Statement of Aptitude

DIAC - Rural Territorial Property Tax Information and Update Document

DIAT - Rural Territorial Property Tax Information and Assessment Document

EMBRAPA - Brazilian Agricultural Research Corporation

PPE - Personal Protective Equipment

FDA - Food and Drug Administration

FUNAI - National Indian Foundation

FNRB - National Benefit Sharing Fund

IBAMA - Brazilian Institute of Environment and Renewable Natural Resources

INCRA - National Institute of Colonization and Agrarian Reform

INMETRO - National Institute of Metrology, Quality and Technology

INSS - National Institute of Social Security

IP - Preserved Identity

ITR - Rural Territorial Property Tax

MDS - Ministry of Social Development

MS - Ministry of Health

MPT - Labor Prosecutor

MTE - Ministry of Labor and Employment

MT - Ministry of Labor

PREVFOGO - National Forest Fire Prevention and Fighting System

PRONAF - National Program for Strengthening Family Farming

SAFs - Agroforestry Systems

SEJUS - Secretariat of Justice and Citizenship of the State of Ceará

SDA - Secretariat of Agrarian Development

SINDCARNAÚBA - Union of Carnauba Wax Refining Industries of the State of Ceará

SEBRAE - Brazilian Micro and Small Business Support Service

SEMACE - State Superintendent of the Environment

SEMAR - State Secretariat of the Environment and Water Resources

SENAR - National Rural Learning Service

SINRURAL - Rural Producers Union

SISGEN - National Management System of Genetic Heritage and Associated Traditional Knowledge

SRTE - Regional Superintendence of Labor and Employment in Ceará

STDS - Secretariat of Labor and Social Development

TAC - Conduct Adjustment Term

UEBT - Union for Ethical BioTrade

UECE - University of Ceará

UFC - Federal University in Ceará

UFV - Federal University in Viçosa

UEFS - University of Bahia in Feira de Santana

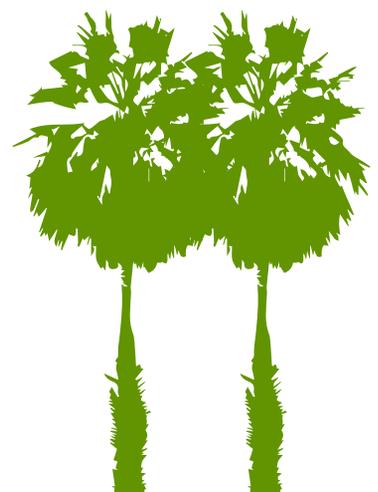


TABLE OF CONTENTS

PRESENTATION	10
CHAPTER 1 - THE CARNAUBA PALM	
General aspects	14
Current Applications	17
CHAPTER 2 - ENVIRONMENTAL AND SOCIAL CONTEXT	
The importance of the sustainability of the carnauba production chain for the protection of the Caatinga biome	24
Carnauba-related environmental challenges	25
Social Issues - Understanding the extractive carnauba chain	28
Main types of productive arrangements:	28
Working conditions in the carnauba production sector	32
Social vulnerability in carnauba working communities	32
Slave and slave-like labor	32
CHAPTER 3 - LEGISLATION	
Environmental regulations and legislation	36
Access and benefit sharing	38
But, what does it have to do with the carnauba?	38
Exemption from benefit sharing	38
How should benefits be shared?	38
CHAPTER 4 - LABOR, SOCIAL ASSISTANCE AND PENSION ISSUES	
Regularization of employment relations	42
General instructions for employers and workers in the extraction stage	44
Special Social Security and Rural Retirement	46
“Bolsa Família” (Family Assistance Program)	46
TAC - Terms of Conduct Adjustment	47
CHAPTER 5 - GOOD PRACTICES AND TECHNICAL RECOMMENDATIONS	
Preparation stage	50
Mapping the carnauba groove	51
Estimated production	52
Financing and credit sources	52
Carnauba forest tract Lease Agreement	53
Hiring staff	53
Land preparation and biological control	53



Extraction phase	57
Distribution of Personal Protective Equipment (PPE)	57
Straw cutting	60
Transporting to the drying site	62
Solar Dryer - Productivity and Yield	63
Industrial treatment and processing phase	66
Powder beating	66
Powder storage and transportation	68
Wax production	68
Wax quality - Industrialization, composition and product specifications	68
CHAPTER 6 - CARNAUBA PRODUCTIVE CHAIN TRACEABILITY	
Proposed traceability model for the carnauba chain	72
Participating actors in the traceability system	73
Traceability Certification	74
Key traceability levels for sustainable certification systems	74
Accountabilities in the carnauba traceability system	76
Proposed traceability model for the carnauba chain	77
APPENDIX – ORGANIZATIONS AND CONTACTS / SERVICE POINTS	78
BIBLIOGRAPHIC REFERENCES	80
ANNEX	86



PRESENTATION

The carnauba is a palm tree native to Brazil. A synonym for evergreen resilience, regardless of the season, it is called the “Tree of Life.” As the state symbol of both Ceará and Piauí, carnauba is very important for its social, cultural, environmental and economic aspects.

Carnauba has been used for centuries. The most familiar activities are straw handicrafts and dust extraction for wax production, but this palm has several uses: the roots are medicinal, the trunk has been widely used in construction, the core can be used as food for animals, the dried straw, known as “bagana”, serves as an excellent quality organic fertilizer and the wax has multiple uses in various branches of industry.

The carnauba is essential in balancing the environmental ecosystem. It helps sustaining soil conservation, as well as protecting rivers from erosion and siltation. Its trunk can serve as shelter and its fruits as food for the native fauna.

In the productive sector, the carnauba wax provides a profitable activity for a large number of rural workers in the Caatinga biome, during the dry season — especially between August and December, which is straw harvesting time. This is highly relevant for the rural population, since small scale farming in the Brazilian semi-arid region is largely dependent on the seasonal rainfall, which normally lasts 4 months in the first half of each year.

The activity of extracting carnauba powder feeds the national, as well as the international, wax market, and is one of the most important export products in the states where this activity exists.

The MPT (Labor-Related Public Prosecutor’s Office) and the MTE (Ministry of Labor) conducted inspection operations that identified situations in which extractive workers were subjected to degrading conditions, which drew local



and international attention. As a result, efforts from various institutions have intensified to qualify the carnauba production chain.

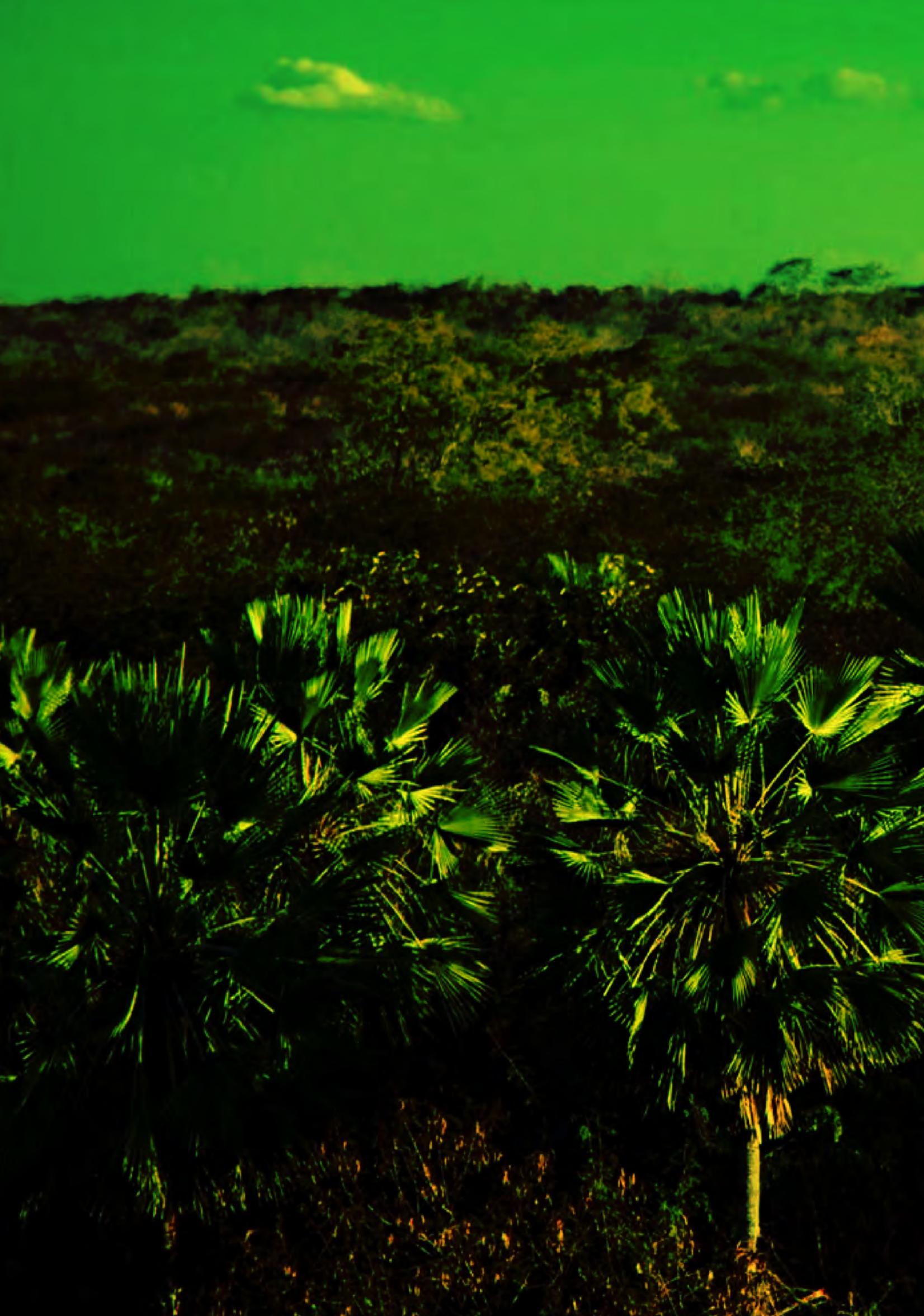
There are many challenges in the sector. We may highlight some of them:

- High informality in the employment relations between producers and extractive workers, often in disregard of labor legislation;
- Social vulnerability of the extractive worker communities;
- Extractive producers and workers with poor access to information;
- Infestation of the invasive species *Cryptostegia madagascariensis*, known as rubber vine, devil's claw or devil's nail, that causes the death of inappropriately managed carnauba forests;
- Carnauba deforestation for the installation of other enterprises;
- Difficulties in tracing the production between the collection area and its arrival at industries;
- Low technology and productivity in the extraction process, mainly from straw collection to the removal of the ceriferous powder;
- Small producers with poor access to credit;
- Lack of constant training in good management practices and work safety for extractive workers.

Thus, this manual is a good practice guide aimed at contributing to the qualification of the carnauba production chain in its multiple aspects and trying to best respond to the challenges posed above.

It is intended for extractive workers, producers, shift leaders, tenants, consolidators (middlemen), companies, and all those involved in this unique productive cycle. We created and we want to disseminate this material for these actors to be able to understand more about their rights and duties and for this activity to be increasingly sustainable, respecting the environment and the dignity of the people.





CHAPTER 1

THE CARNAUBA PALM



General aspects

The carnauba palm or “carnaubeira” is a palm tree that belongs to the genus *Copernicia*, a group of plants present in various countries of the world, in places such as Equatorial Africa, Ceylon, Ecuador and Thailand. In South America it is possible to find examples of the genus such as *Copernicia tectorum*, in Venezuela, and the *Copernicia alba*, in Bolivia, Paraguay and Brazil — more specifically in the region of Pantanal in the state of Mato Grosso —, where it is called carandá. None of these species produces wax like carnauba does, due to the high humidity in the regions where it grows.



Image 1: Occurrence of Copernicias in South America - Source: SC Johnson.

**BRAZIL IS THE ONLY COUNTRY
IN THE WORLD THAT
PRODUCES CARNAUBA WAX.**

Plants generally produce ceriferous powder to prevent water loss through transpiration. In dry regions, such as in the Brazilian Northeast, this mechanism acts to protect

the leaves for long periods of insolation, as well as from the potential attack of fungi (GOMES, 1945; BAYMA, 1958; CARVALHO, 1976; CARVALHO, 1982).

Popular names: Carnaubeira, carnaíba, carnaíva, carnaúva, carandaúba, carnaúba. This plant is given different names because it grows in many places. The most popular is carnauba, which is used to refer to the palm itself and its fruit.

Family: Arecaceae.

Scientific name: *Copernicia prunifera* (Miller) H. E. Moore.

Geographic distribution: Carnauba is an exclusive species from Brazil, which grows in the Caatinga and Cerrado biomes. It is found in the Northeastern (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe), Northern (Tocantins), and Midwestern (Mato Grosso) states, however, Carnauba populations are concentrated in the states of Piauí, Ceará and Rio Grande do Norte, always in the river valleys and on poorly-drained sandy land.

**THE WORD CARNAUBA COMES
FROM THE NATIVE INDIAN
LANGUAGE TUPI AND MEANS
“SCRATCHING TREE”.**



Image 2: Carnauba distribution in the Northeast.

Reproduction / dispersal: Carnauba is a predominantly allogamous species, that is, it needs the crossing of more than one carnaubapalm to produce fruits. Pollinating agents, which conduct the flow of pollen between plants, are of equal importance. For carnauba, the “marimbondo-caboclo” - *Polistes canadensis* Linnaeus - and the “irapuá” - *Trigona spinipes* Fabricius - are commonly observed visiting the flowers (Photos 3 and 4). The fruits of the carnauba palm serve as food for animals such as bats, pigs, wild hogs and some Psittacidae (parrots and parakeets), one of the best assisting factors in spreading the seeds of this species.



Image 3: Marimbondo-caboclo – *Polistes canadensis*
Source: <https://bit.ly/2SXZOCK>



Image 4: Irapuá – *Trigona spinipes* – Source: <https://bit.ly/2yvEQ4q>

Life span: Estimated to live up to 200 years.

Size and maturity: Ranges between 7 and 15 meters. It grows slowly and reaches productive maturity within about 10 years, when the leaves begin to produce the ceriferous powder. When young, up to approximately 4 meters, the carnauba continues to hold the fallen leaf petioles all along the base, and it is called a “cuan-

du”, which is the name given to a type of hedgehog. When it reaches maturity, the upper part is freed from the base of the petiole (JOHNSON, 1970).



Image 5: Comparison between the size of a human and an adult carnauba
Source: Caatinga Association Collection



Image 6: Young carnauba – Source: Caatinga Association Collection

Leaf: Takes on a fan shape and a coarse texture, besides the layer of ceriferous powder, which comes out of the leaf when dried.



Image 7: Carnauba leaf.
Source: Caatinga Association Collection

Fruit: The palm bears fruit from November to March. The fruit is oval in shape and looks like small coconuts. They cluster in bunches of hundreds of units, look bright, and are bright and greenish when young and purple when ripe (Figures 8 and 9).



Image 8: Green carnauba fruit
Source: Vicente de Paula Queiroga



Image 9: Ripe carnauba fruit
Source: Vicente de Paula Queiroga

Trunk: The trunk reaches an approximate diameter of 25 cm, without branches, marked by the scars left from the falling leaves (Images 10 and 11).



Image 10: Carnauba trunk with sheath (smooth).
Source: Caatinga Association Collection



Image 11: Carnauba trunk without the sheath (smooth).
Source: Caatinga Association Collection

Roots: Beam-shaped, with roughly equal branches in thickness and length, fibrous, abundant and grow deep. Roots contain small, slightly yellowish crystals with a weak alkaline taste and are water soluble (SANTOS, 1979; CARVALHO, 1982).



Image 12: Fasciculated root system of the *Copernicia prunifera*.
Source: Vicente de Paula Queiroga.

Current Applications

Known by many as the “tree of life,” the carnauba is a palm tree that is useful from the root to the leaf. Parts such as the trunk, the heart of palm, the root and the fruit have been widely used in the past, thus generating some historical records about their applications. Today, some of these uses are no longer widespread or allowed.

Table 1: Historical Uses of the Carnauba

STRUCTURE	USE
ROOTS	The only part of the plant with medicinal application. Thanks to its purifying and diuretic qualities, it has been used to treat rheumatism, arthritis, ulcers and rashes. It also has culinary value, in view that, upon burning, a saline substance is extracted, which was commonly used by native Indians to spice food (BRAGA, 1976).
TRUNK	Was widely used in the colonial period as wood for construction and joinery. Several qualities made this wood the quintessential material of early colonial buildings, whether civil or military: the straight trunk, the resistance to termites and other insects, the durability when kept dry or immersed in salt water, the abundance of carnauba woods and easy extraction. In the countryside, the trunks were used to build corrals, and are still present in the roof structure of many houses (BRAGA, 1976).
THE CORE	Was widely used as food and animal feed during the dry seasons. In its use in the raw state, the core of the palm was “trampled” and washed to obtain carnauba flour and carnauba starch (CARVALHO, 1982).
FRUIT	Used for human nutrition and feed for animals, mainly pigs. Traditionally, local folks used to toast the carnauba almonds and turn them into powder to make porridges and also to extract from this powder a beverage to replace coffee (BRAGA, 1976). The oil extracted from the almonds has also been used for human feeding (CARVALHO, 1982).

Currently, the most common applications of the carnauba palm tree are derived from extracting the powder for wax production, the use of its straw for handicraft making, and the use of the living plant in landscaping and urban furniture.

Carnauba wax has been the subject of many research studies aimed at its use in various sectors due to qualities like:

Absence of toxicity: Thanks to this feature, carnauba wax can be applied to edible products for humans, such as medicines and food. For instance, carnauba wax is applied to certain fruits as a coating, preventing water loss and

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TYPES OF CARNAUBA

In addition to the common carnauba, which makes up the majority of carnauba palm trees in the Northeastern region of Brazil, there are some variations in the species, yet without a definitive scientific description. They are:

- The thornless carnauba: has short leaves, a smaller crown and a stalk with fewer thorns.
- The giant carnauba: is distributed along the banks of the Acaraú River, in Ceará. At adulthood, its minimum observed height is 15m, and can reach up to 30m. Its leaves are also larger than those of the common carnauba.
- The white carnauba: valued for its medicinal qualities, has the narrowest leaves, and is easily recognizable. It is a rare variety and wax is not extracted from it.

PRODUTOS DE BELEZA E ALTA TECNOLOGIA TAMBÉM USAM A CERA DE CARNAÚBA.

A resistência do batom ao calor é obtida acrescentando-se a cera de carnaúba à sua composição, mantendo sua consistência mesmo em altas temperaturas.

Por não conduzir energia elétrica, a cera também vem sendo usada como isolante em circuitos eletrônicos. Além disso, ela pode ser aplicada em outros componentes eletroeletrônicos, protegendo contra a umidade. Outra aplicação é em tintas térmicas que facilitam a leitura de códigos de barras.



Image 13: Examples of industrial products containing carnauba wax.

maintaining its quality for a longer period. In the pharmaceutical industry, carnauba wax has been used for tablet coating, contributing to longer conservation.

Brightness: Excellent for polishing and used as a differential in products that must be glossy for better appearance. The most notorious application is used in polishing floors, furniture and cars. Among vegetable and animal waxes, carnauba wax is the most resistant and the brightest.

Hardness and Melting Point: The melting point of this wax is around 84 °C and it is therefore used in products that will be exposed to high temperatures.

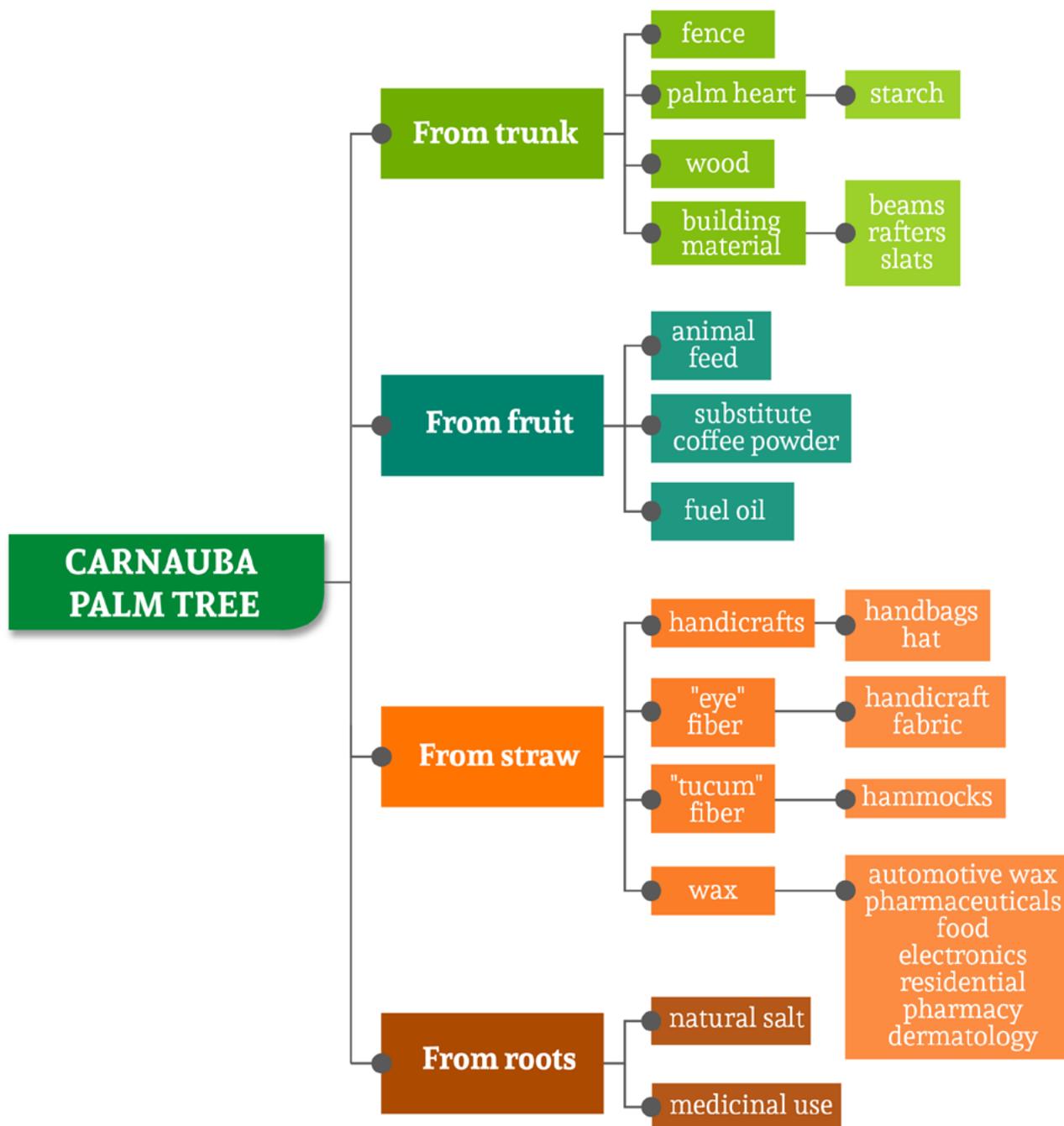


Image 14: Organizational chart of the multiple and integral use of the carnauba palm tree.

Although this plant species grows in several Brazilian states, only a few regions stand out in the production of powder and wax. The most productive states are Ceará, Piauí and Rio Grande do Norte.

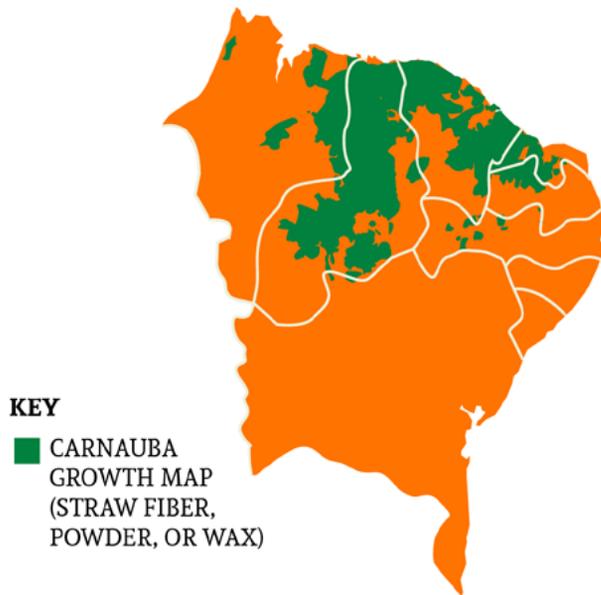


Image 15: Carnauba Growth Map (straw fiber, powder, or wax) in the BNB (Banco do Nordeste do Brasil, a mixed economy regional development bank) Operation Area, 2006. Source: Adapted from IBGE - Brazilian Institute of Geography and Statistics (2007).

After the wax, the most economically important product derived from the carnauba palm tree is its straw, which can be used as a fertilizer, in the making of handicrafts and for the production of paper.



Image 16: Carnauba straw in its fertilizer and mulch version, the so called "bagana". Source: Caatinga Association Collection



Image 17: Handicrafts of carnauba. Source: <https://bit.ly/2DOQnQq>



Image 18: Handcrafted of carnauba. Source: <https://bit.ly/2ZxctxM>



Image 19: Paper made from carnauba straw - Source: SDA.



Image 20: Paper made from carnauba straw - Source: SDA.



Image 21: Paper made from carnauba straw - Source: SDA.



Image 22: Craftswoman of the Carnaúba Viva Project. Source: <https://bit.ly/2P86jjw>

The so-called carnauba “eye”, which is the common name for the young leaf around the palm’s growing point, is also used for the straw fiber extraction, locally named “ticum” or “tucum”. Such extraction was a common activity among indigenous and traditional communities for the manufacture of ropes and hammocks. Currently, the technique is still known, but not widely used and practiced due to its low commercial value (D’ALVA, 2004).

In landscaping, the carnauba plant has also been widely used as urban furnishing for squares and gardens in the Northeastern cities, because of its elegance and mainly because it is a local species, adapted to the semiarid climate (ALVES; COELHO, 2008).

There are productive clusters for carnauba straw handicrafts in nine cities of Rio Grande do Norte, where Carnauba Viva NGO associated artisans produce carnauba straw straps and blankets to cover the oil pipelines through which hot oil exploration steam passes (heat insulator).



Image 23: Craft production of “ticum” hammocks.
Fonte: <https://bit.ly/328Nq64>



Image 24: A city boulevard with carnauba palm trees.
Fonte: <http://twixar.me/hXv1>



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HISTORY OF CARNAUBA WAX USAGE

The beginning of carnauba wax extraction is related to the colonization process of the Brazilian Northeast region. As usual, in regions colonized by Europeans during the Age of Discovery, the Brazilian Northeast region was initially colonized from the coastline. Since the coastal climate was very good for agriculture, that region, from the very beginning, served for the plantation of sugarcane and for the extraction of natural resources, such as brazilwood (*Paubrasilia echinata*). Thus, the heartland of the states, however, remained unknown to European colonizers for a long time.

With the population growth and successful business of sugar mills, conflicts over the land began to arise between sugar mill owners and ranchers. Then, the Portuguese crown issued the Royal Charter of 1701, which forbade cattle-raising within less than 10 leagues from the Brazilian coast.

Thus, cattle farmers were forced to look for new areas and began to enter the heartland territory, usually following the river courses. The wetlands along the rivers were the preferred areas for livestock activity. Riverbanks were — and still are — often populated by dense native carnauba groves. As cattle-raising progressed, the ranchers learned how to take advantage of carnauba palm tree parts: the wood for construction, the straw for utensils, the core for animal feed, the roots for salt and medicine and the wax for candle making (OSCAR ARRUDA D'ALVA, 2004). Many of these usages were possibly learned from the native Indians.

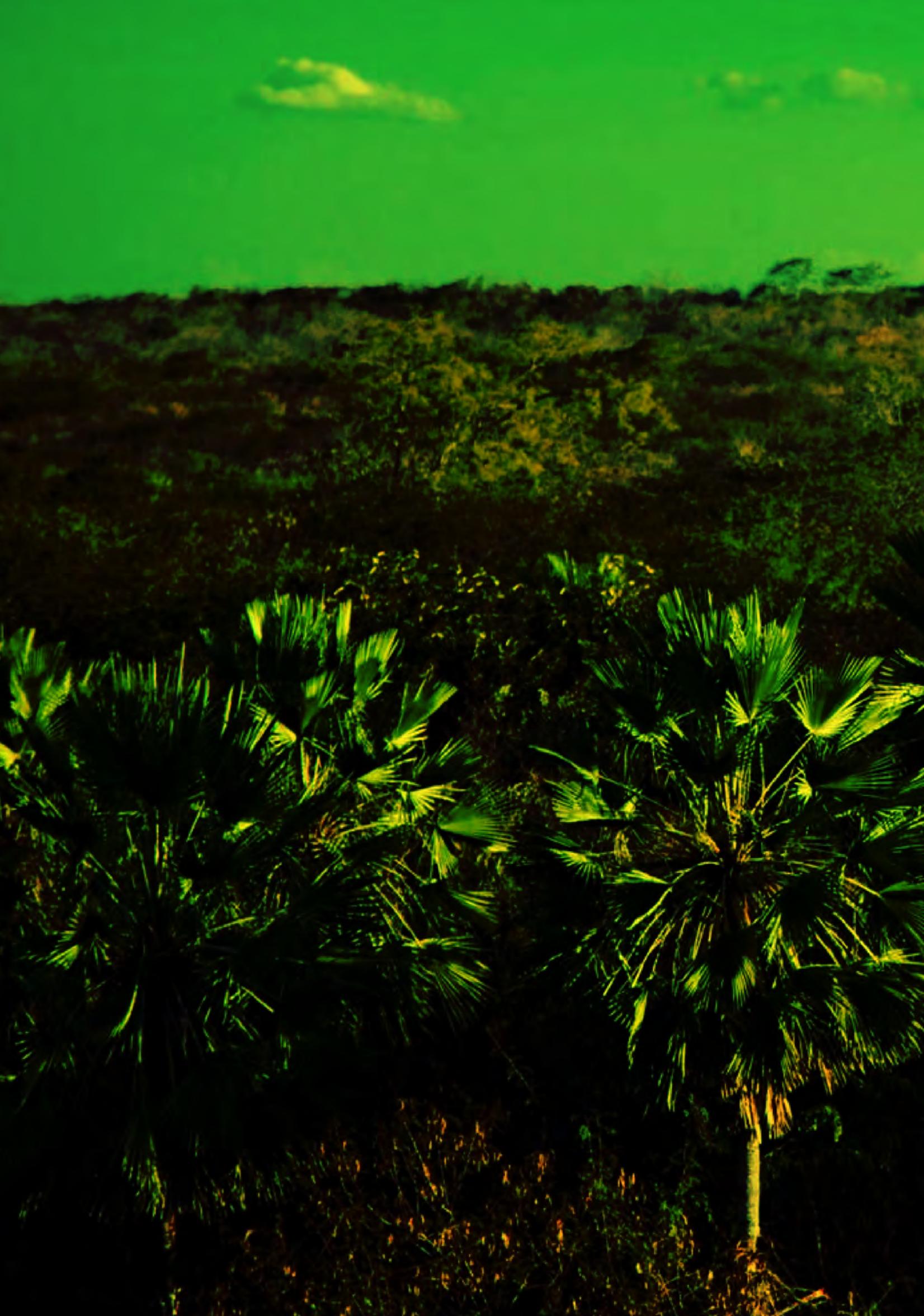
Later, in the nineteenth century, with the end of the cotton plantation cycle in the Brazilian Northeast region, the carnauba palm tree represented an important alternative for local traders to compensate the losses generated by the end of that cycle. Carnauba wax turned out, then, to be exported for candle making in Europe.

Since the wax producing species only grows in the states of Piauí, Ceará, Rio Grande do Norte and Maranhão, the carnauba was responsible for the emergence of a new and equally important economic cycle in these locations, with an economic boom between the First (1914 - 1918) and the Second World Wars (1939 - 1945).

During the interwar period, the wax was widely exported for use in manufacturing gunpowder. The systematic planting of carnauba grooves was carried out in the Brazilian Northeast region from 1936 to 1947. More than ten million carnauba palm trees (equivalent to 9,000 ha) were planted in the states of Ceará (in the municipalities of Russas, Acaraú, Granja, Massapê, Sobral, Morada Nova, Pacajus, etc.) and Piauí (municipality of Luís Correia).

During this period, there were several attempts by the government to legislate on and monopolize the carnauba exploitation. Among those were, Decree No. 1419, of October 1, 1932, during the government administration of Leonidas de Castro Melo, which defined: "(...) the cutting of living carnauba palm trees in the State of Piauí is forbidden, whether it is practiced by landowners or by any other person". And Decree No. 33, of November 19, 1933, in the same administration, which determined "(...) the exportation of seeds and seedlings of carnauba palm trees to other states and abroad is forbidden" (GOMES, CERQUEIRA E CARVALHO, 2009).

In 1947, with the end of World War II, international demand for the product shrank. However, some years later, in the 60s and 70s, due to the advance in the Brazilian industrialization process, new industrial applications for carnauba wax were discovered. A new market was formed for the product, which — since then — has been mobilizing a large number of people, companies and investments.



CHAPTER 2

ENVIRONMENTAL AND SOCIAL CONTEXT



The importance of the sustainability of the carnauba production chain for the protection of the Caatinga biome.

The Caatinga is an exclusive Brazilian biome, comprising a total area of 826,411 km². It is present in eight of the nine Northeastern states: Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe, Bahia and it is also present in a northern strip of Minas Gerais. Caatinga covers approximately 10% of the national territory and 70% of the Northeast region, and borders with three other biomes in the country, the Amazon, the Atlantic Rainforest and the so called “Cerrado” (Brazilian savannah).

A semiarid climate prevails in the Caatinga, with approximately 800 mm of poorly distributed rainfall per year, resulting in long periods of drought.

The carnauba palm tree, is an easily adaptable species and, thus, is spread over large territories, greatly impacting the locations. Besides economic and cultural impacts, we also noticed a remarkable ecological influence of this northeastern palm on the environments.

The fact that the carnauba palm tree is a species that grows along rivers and streams in general, helps to prevent siltation in the water bodies and to control soil erosion in the areas where it is located.

The fruits of the carnauba palm tree serve as food for animals such as bats, pigs, wild hogs and some Psittacidae (parrots and parakeets), one of the best assisting factors in spreading the seeds of this species. Bees also consume nectar and pollen from its flowers to make honey, helping to pollinate this species.

Nevertheless, the relationship between the carnauba palm tree and animals is not limited to feeding, but is also related to aiding migration processes and balancing the ecosystem. Birds, for example, often use this palm tree to nest and rest when flocking.



Image 25: Caatinga fauna montage. Source: Caatinga Association.

As a good example of sustainable use of carnauba, we have its industrial processing to obtain the wax. The cutting of leaves, when well conducted, does not harm the palm and even slows aging. The drying of leaves is commonly performed with sunlight. In the extraction of the ceriferous powder, the leftover straw becomes an organic fertilizer and mulch (known as “bagana”). In the production of raw wax, the solvent used is water. In industries, filtered waste is recycled to produce wax and organic fertilizer. In the clarification process, the reaction of hydrogen peroxide releases water vapor and oxygen to the environment (CARVALHO; GOMES, 2008).

Therefore, the carnauba is considered a natural resource with sustainable exploitation, a source of job creation, income and currency with a high social factor, due to the large amount of manpower employed in the dry season, stabilizing people in the countryside (CARVALHO; GOMES, 2008). For these reasons it is important to notice the environmental challenges that threaten carnauba grooves and respective biodiversity and to join our efforts in fighting them.

Carnauba-related environmental challenges

Carnauba forests depend on natural regeneration to remain conserved and sufficiently productive. Most of those forests are native vegetation - not planted areas. A good management can contribute to the health of those forests. The carnauba production chain currently faces several challenges that hinder its maintenance and sustainability.



DEFORESTATION

Situation:

- Loss of carnauba grooves due to changes in land use or improper harvest management.
- Use of illegal firewood in wax processing and in other sectors (i.e.: ceramics and food).

Solutions and perspectives:

- Planting new carnauba seedlings in the riparian forest space and in wetlands and swamp areas.
- More intense environmental agency enforcement to ensure the replenishment of carnauba palm trees, when authorized cutting occurs.
- Use of authorized firewood and replacement of the energy matrix by another more efficient and sustainable.



CLIMATE CHANGE

Situation:

- Drought in the Caatinga even causes native forests to lose trees, making them more vulnerable to invasive species such as the devil's nail.
- Loss of water resources, essential to carnauba working communities and to a healthy functioning of the ecosystem, generating social and environmental vulnerability; - Carnauba palm leaves become smaller due to climate change, producing thus less wax (production losses).

Solutions and perspectives:

- Use of native species (carnauba palm trees, for instance) in forest restoration processes - especially using hydrographic basins as geographical references - in order to privilege areas that are ecological corridors, in addition to being responsible for forming and retaining soil, regulating erosion processes and river siltation.



LACK OF PROPER MANAGEMENT

Situation:

- Persistent use of fire in agriculture, causing the risk of arson.
- Extensive use of Caatinga wood for firewood, fences, construction, causing the loss of biodiversity and unplanned changes in land use.

Solutions and perspectives:

- Dissemination of more environmentally friendly cultivation methodologies, such as Agroforestry Systems (so called SAFs) and Productive Backyards.
- Environmental education and incentives for native and manageable Caatinga forest cultivations, giving people from the countryside better income improvement possibilities.



BIO INVASION

Situation:

- Death of the carnauba grooves, not managed after the devil's claw invasion. Infestations are very aggressive and tend to exterminate the abandoned carnauba grooves.

Solutions and perspectives:

- Scientific research focused on biological controls;
- Manual management with the cutting and removal of the invasive species, as well as with mechanical aid, such as tractors and blades for removal.



GAP IN SCIENTIFIC DATA

Situation:

- Research on carnauba production chain development are incipient and need much more public and private promotion.

Solutions and perspectives:

- There is a need to intensify the efforts of improving research, in order to release and disseminate more data, allowing the productive sector to improve itself and meet the increasingly urgent needs of sustainable production.





LOSS OF BIODIVERSITY

Situation:

- The decrease in Caatinga's fauna and flora populations, directly impairs the biome balance and the carnauba productive chain. A good example of this, is the reduction in the Psittacidae (parrots, parakeets, macaws and other similar species) population, due to hunting and animal trafficking. These animals spread seeds, including carnauba seeds, acting fundamentally to renew of carnauba grooves.

Solutions and perspectives:

- Conservation and environmental education projects aimed at the recovery of native forest and fauna, with actions to reforest and reintroduce fauna in its habitat and to disseminate methodologies for sustainable coexistence with nature.



ENVIRONMENTAL EDUCATION

Situation:

- Lack of contextualized environmental education actions in many units of the basic education network, as well as in the productive, agricultural and other sectors.

Solutions and perspectives:

- Environmental education projects that address these issues with carnauba productive chain workers, so that each worker can become a disseminating agent for biome conservation and its sustainable use.



Social Issues - Understanding the extractive carnauba chain

Main types of productive arrangements:

Family farming:

Family farming guidelines are provided by **LAW NO. 11326, OF JULY 24, 2006**. According to this law, a family farmer and a rural family entrepreneur are those who practice rural activities under the following conditions:

I - does not hold, in any capacity, an area larger than 4 (four) fiscal modules (note: a Brazilian unit of measure);

II - predominantly use family labor in the economic activities of their companies or business;

III - have a minimum percentage of the general family income originating from the economic activities of their companies or business, as defined by the Executive Office;

IV - run their companies or business with their families.”

Foresters, aquaculture farmers, extractivists, fishermen, native Indians and members of remnant Quilombola communities and other traditional folk and communities that meet the criteria established by law, may also be considered family farmers.

Decree 9064, of May 31, 2017, regulated Law No. 11326, of 2006, by establishing two forms of rural family organization:

- UFPA (Family Farm Production Unit) is a family group of individuals that exploits a combination of production factors, aiming to meet their own subsistence and society's demand for food and other goods and services, and that reside at the establishment or in a place nearby.

- Rural family business is an associative or individual form of family farming formalized as a legal entity, which embraces the

following concepts: rural family business, single family farming cooperative, central family farming cooperative and family farming association.

Both Law No. 11326, of 2006 and Decree 9064, of May, 31 2017, allow family farmers to engage in extractive activities.

Working in family farming does not require the employment record book (CTPS) to be signed, but does require all workers of the family nucleus to use personal protective equipment (PPE) and to comply with other occupational health and safety standards.

It is important to be careful not to employ relatives who are not part of the family nucleus, because, in this case, the family business is no longer typified, and CTPS signing by the landowner or the tenant is mandatory, according to Brazilian Labor Laws.

ATTENTION

Regarding Labor, the farmer, his/her spouse or partner and their single children aged between 18 and 21 years are included in the family nucleus. If the children are married or over 21 (even single) and are working in the rural productive activity, the signing of the CTPS is not mandatory, as long as they enter into a partnership agreement. After all, in the above condition, the children already constitute another family nucleus.

It is important to clarify that employing minors under the age of 18 is strictly forbidden at any stage of the carnauba wax productive chain, even if the worker is part of the family nucleus under the rural family business.

Partnership Agreement:

A rural partnership agreement entails one party (called the assigning partner), who assigns another party (called the assigned partner) rural property, animals or machinery and agricultural utensils, with the purpose of jointly engaging certain rural activity. It is governed by Law No. 4504, of November 30, 1964 (Land Statute), and regulated by Decree No. 59566, of November 14, 1966.

In the partnership agreement to extract carnauba straw, the assigned partner may explore the area alone, on a family business basis or by contracting employees. Each area may be granted to only one assigned partner, which may contract — upon properly signed CTPS and compliance with all applicable norms, — employees to work in the area.

It differs from the Lease Agreement, as in this case both parties join resources and there is a proportional division of profits, determined by the end of the process.

It is also important to clarify that, pursuant to article 96 (VI), of Law No. 4504, of 1964 (Land Statute), the landowner's (assigning partner) quota from the results of the partnership, shall not exceed:

- a) twenty per cent (20%), on the partnership bare land;
- b) 25% (twenty five percent), when they partner with the land already prepared;
- c) 30% (thirty percent), when they partner with the land already prepared and provide housing;
- d) forty per cent (40%), on the partnership with a basic set of improvements, especially consisting of housing, sheds, cattle cleaning facilities, fences, ditches or corrals, as the case may be;
- e) fifty per cent (50%), on the partnership with previously prepared land and the basic set of improvements listed in letter "d" of this item, plus the supply of agricultural machinery and tools for cultivation processes, as well as seeds, draft animals, and, in the case of a cattle-raising partnership, one with

farmed animals in a proportion greater than fifty percent (50%) of the total number of heads in the agreement;

f) seventy-five per cent (75%), in ultra-extensive cattle-raising zones where existing farmed animals are greater than twenty-five per cent (25%) of the herd and where milk moiety is adopted and the minimum commission of five percent (5%) per animal sold is established;

g) In cases not provided for in the preceding letters, the landowner's additional quota shall be set based on a percentage of no more than ten percent of the valued improvements or assets made available to the partner.

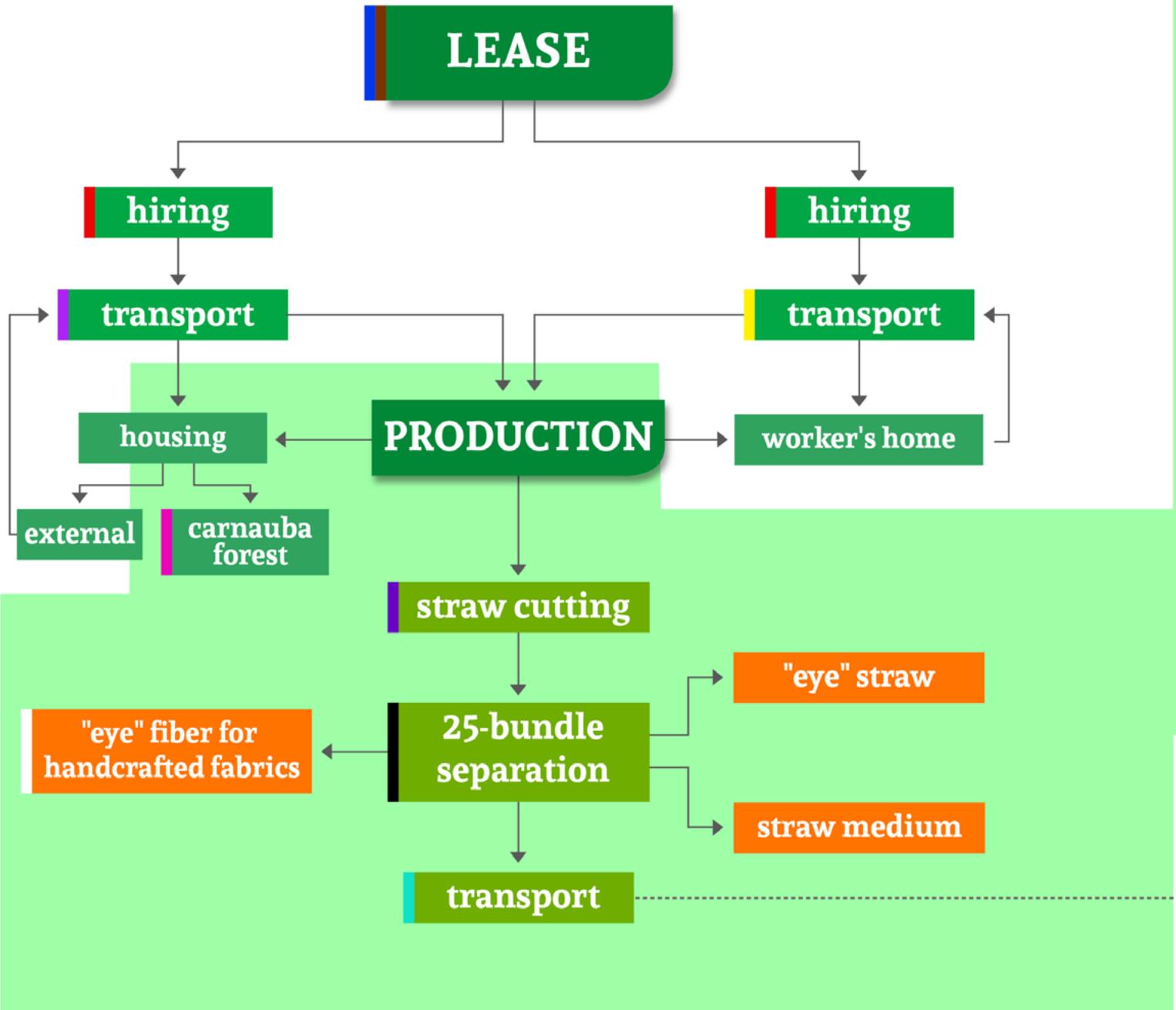
Lease Agreement:

As the main arrangement in the carnauba productive chain, this is an agreement in which the party that owns land or property (i.e.: a carnauba groove), assures another party - through set or adjustable compensation at a certain time - the use and enjoyment of such assets.

In this type of transaction there are two parties involved: the lessee, who enjoys and pays for the property; and the lessor, who owns the land and assigns the rights to its use. In this modality, all the responsibilities, such as hiring and training straw removal work groups, are attributed to the lessee, also called tenant.

In the lease agreement, the service provided in the area works as a rent of the property by the tenant, often paying in advance for its use.

EXTRACTIVISM

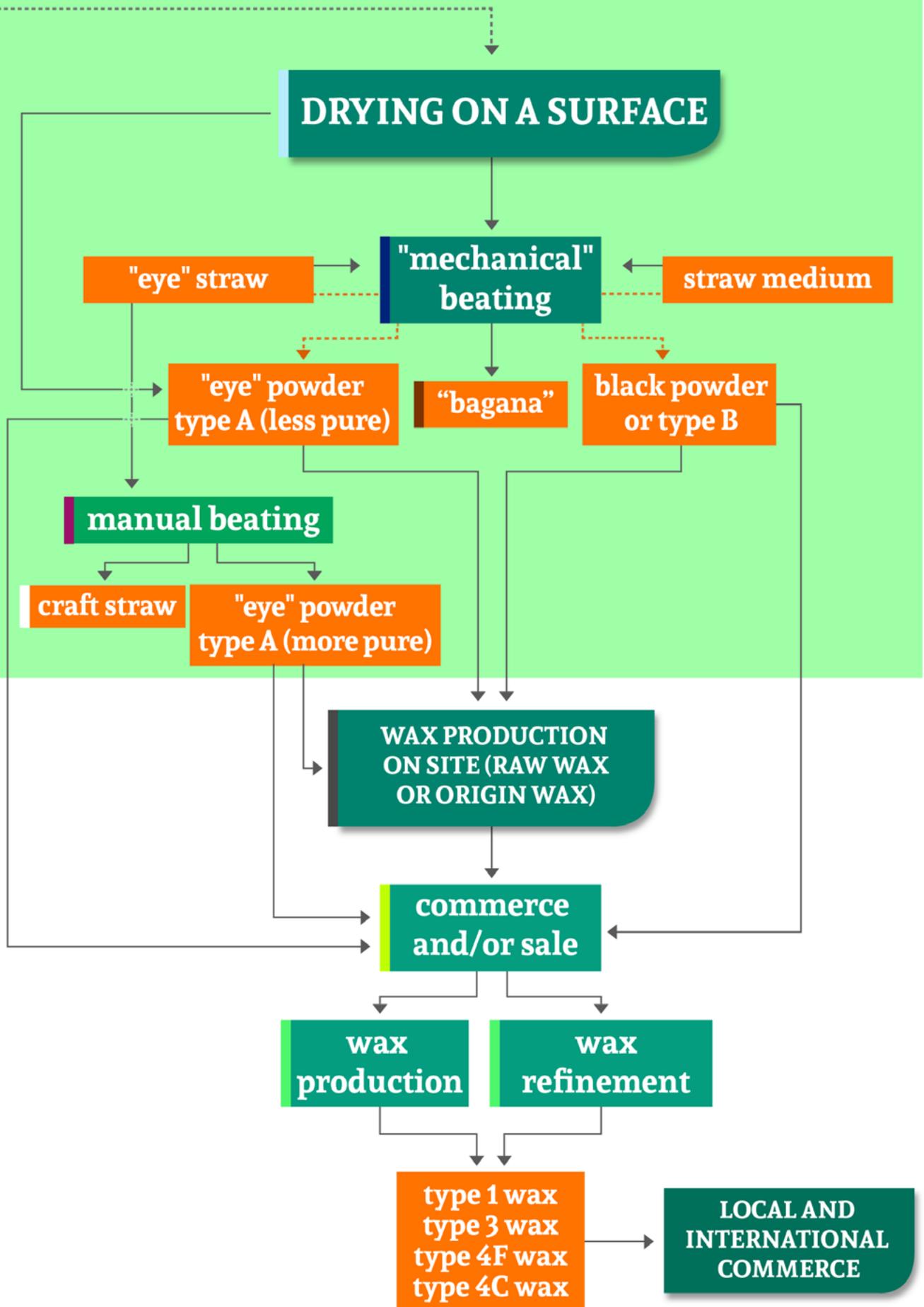


KEY

- | | | | |
|---|---|--|---|
| ■ Carnauba Forest | ■ Extractors other regions | ■ "Lastreiro" (straw-turnman) | ■ Press cookers |
| ■ Products and by-products | ■ Cook | ■ Beater | ■ Driver
Deliveryman
Fiber-cutterman
Operator |
| ■ Carnauba Forest Owner | ■ "Vareiro" (sickelman) | ■ "Juntador" (threadman) | |
| ■ Accountant | □ Craftsmen | ■ Consolidator
Middleman | ■ Capitalized tenant
Decapitalized tenant |
| ■ Local Extractivists | ■ Loaderman | ■ Industry | |

Image 26: Flowchart of the carnauba productive chain in the lease modality

TREATMENT



Working conditions in the carnauba production sector

In the rural environment of the Northeast Brazil, informality is a predominant condition regarding employment relations. This informality gives rise to a large number of verbally contracted (undocumented and unregistered) and improperly hired employees. However, there are production centers where there is a growing number of properly hired workers - signed CTPS - who receive Personal Protective Equipment (PPEs) and proper information about their rights and duties.

For further guidance about regulation on employment relations, as well as labor rights, rural workers should become associated with the rural workers union in their local municipalities.

Social vulnerability in carnauba working communities

Many carnauba working families live in precarious conditions, and rely on social programs to ensure their minimum livelihoods. They live in houses without toilets or access to potable water, and are unable to cultivate due to droughts, amid unemployed family members, malnutrition, poor access to leisure, healthcare and other basic services. Under such difficult conditions, these workers become more vulnerable to degrading work conditions, without access to good-quality water and food, decent housing or work safety.

Slave and slave-like labor

Slave-like labor can be defined as the labor where there is the restriction of any kind to worker freedom, and/or when the minimum rights to safeguard workers' dignity are not

respected. In the Carnauba sector there are records about degrading conditions, which is considered illegal by law.

ATTENTION

In Brazil, submitting anyone to slave labor or slave-like labor is absolutely prohibited, and typified in article 149 of the Penal Code, which states:

“The penalty for submitting anyone to slave-like conditions, either by forced labor or exhausting journeys, and submitting them to degrading work conditions, or restricting their mobility because of debts with their employers or its representatives is 2 to 8 years of imprisonment and a fine, as well as the penalty corresponding to such violence.”

In the Carnauba sector, inspections conducted by public authorities found conditions of work that can be typified as slave-like labor. In certain cases, makeshift, unsanitary housing with no potable water were found, as well as the absence of PPE.

Field experience with communities has also shown that many shift leaders, tenants, who are small-scale producers, do not have sufficient information about their employment-related legal duties. It is a reasonable fact, since rural regions suffer from the lack of the most basic education services, let alone business, legal, and labor training. “... things have always been done this way, my grandfather did this, my father did this...”, say small producers and workers, as well.

Among community members and workers who witnessed inspections, the issue is harsh and controversial, and it is clear that communities still do not understand that

the inspection authorities are workers' allies and that working conditions need to change in order to comply with legal standards.

As for the workers, there is the fear of losing social retirement and social security benefits according to rural retirement legislation and the fear of being disenfranchised from government programs, such as “Bolsa Família” (Family Assistance Program). This fear is based on the experience of workers, who have been disenfranchised from receiving social subsidies after having registered their CTPS (employment record book). However, these doubts can be cleared up in the following chapters. However, these doubts can be cleared up in the following chapters.

As for the employer, there is the fear of not being able to deal with the bureaucracy involved in obeying the law, as well as the fear that the activity will not be as profitable as it once was, because of the extra costs generated by the payroll taxes and the acquisition of safety equipment. Powder productivity performance is very low because of inefficient productive processes. Therefore, the combination of inefficient processes with higher costs is a complicating factor for business initiative.

There are also chief contractors and tenants who live in very similar conditions to those of their hired staff. Some of illegal “degrading” housing facilities are the business owners' own homes. In this same context, some intermediaries, who are capitalized actors, take advantage of precarious production conditions, and oftentimes take in the largest share of the profits, by speculating on the commodity

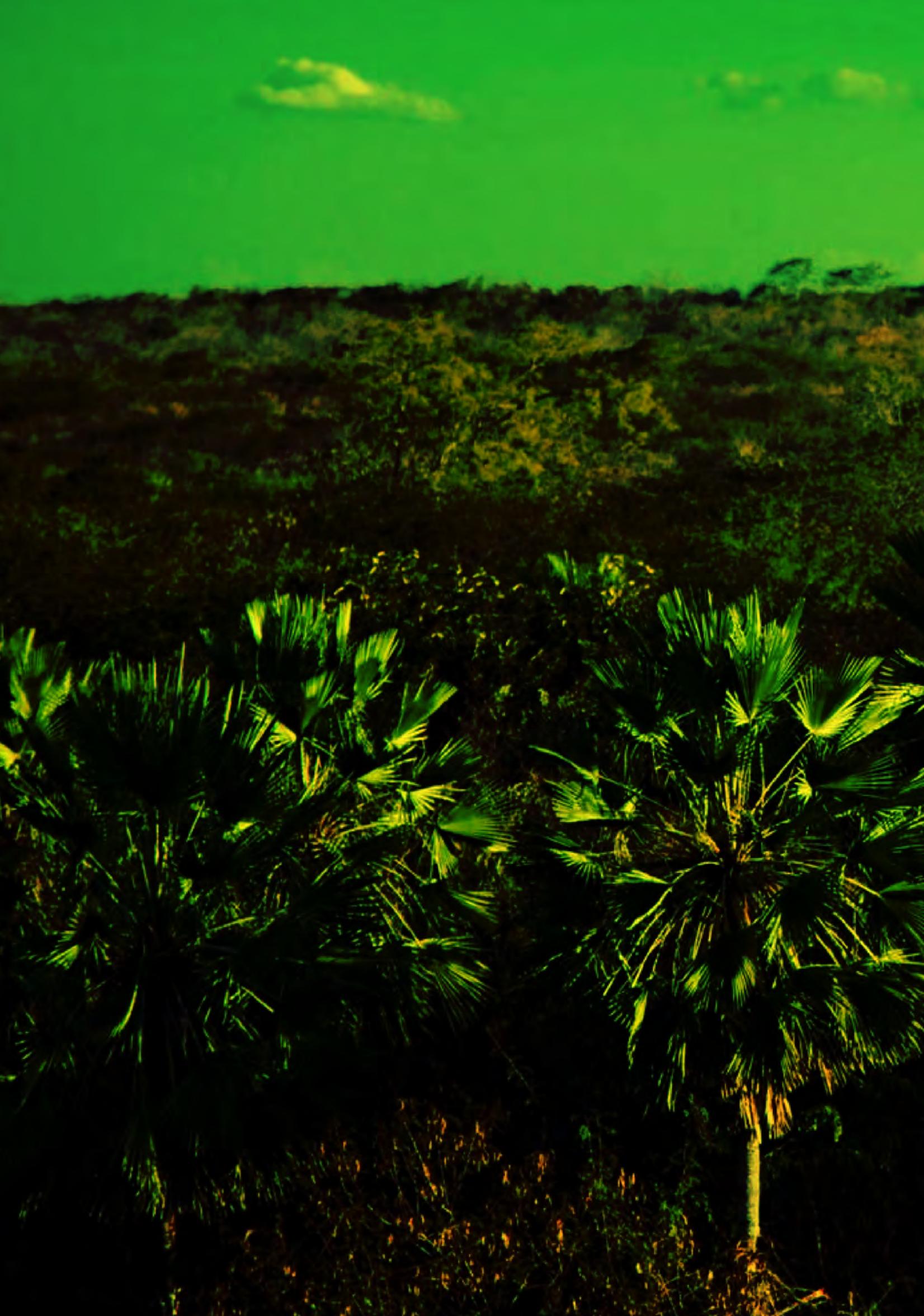
market and thus adding value to the carnauba wax price. It is clear that social vulnerability is a major enemy of the productive sector, weakening all the links in the chain.

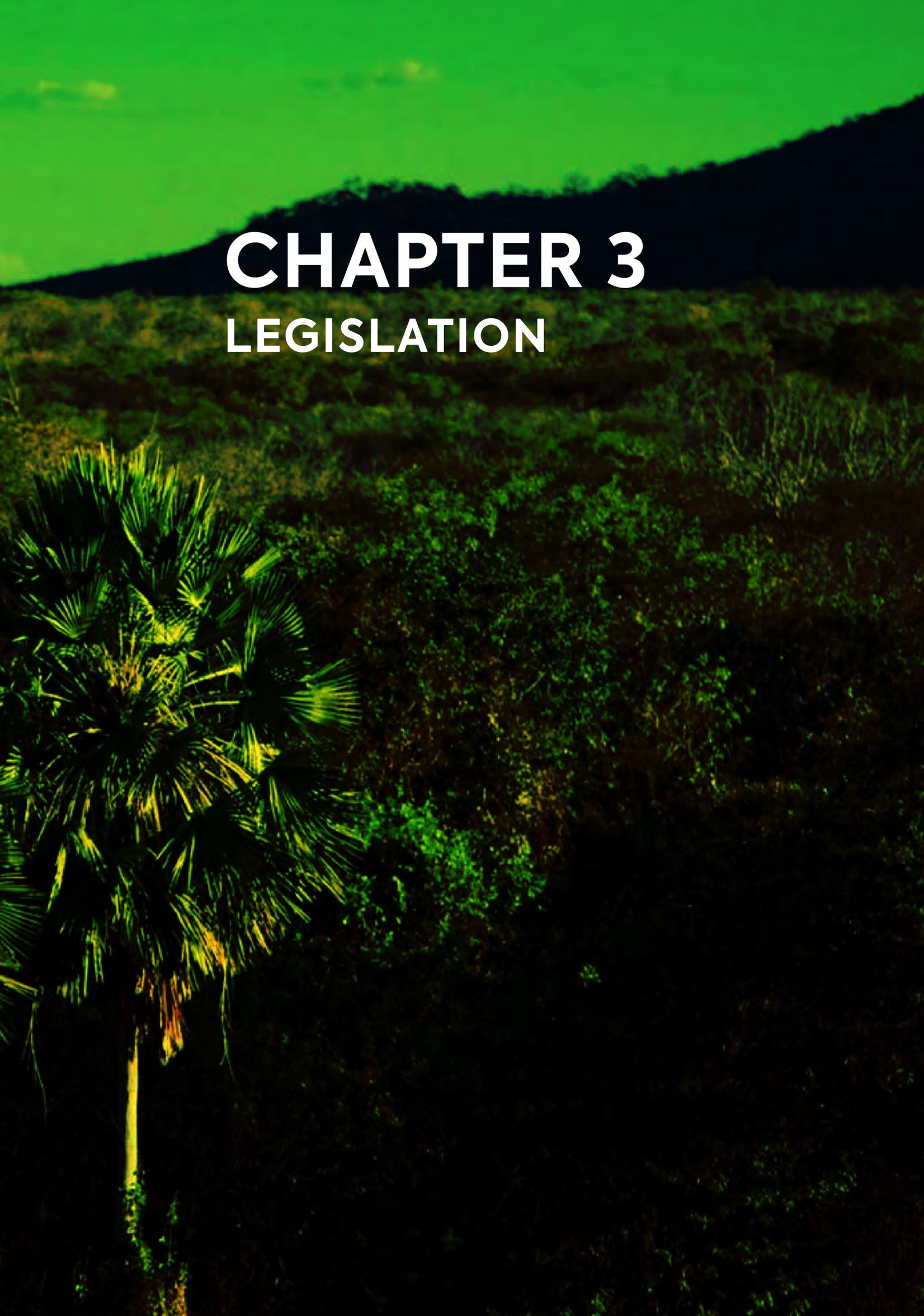
Fortunately, there are many public and private sector, — as well as third sector—, institutions that have been working in the carnauba production chain, which have dedicated their interest and efforts on the matter, to create and strengthen the actors' networks, in order to support and to professionalize the carnauba activity, so that it can reach the current standards of professionalism, productivity and work dignity required worldwide.

Projects such as Carnaúba Sustentável (Sustainable Carnauba), focus on education for workers and powder producers and on the implementation of social technologies, such as low cost concrete cisterns for water storage, eco-efficient wood stoves and Bioágua systems for gray water treatment and reuse, all this to improve the quality of life of the carnauba working populations, mitigating their vulnerability.

Professional carnauba activity is economically important for many families as it ensures compensation in the period of water scarcity, when subsistence farming has no chance of providing the needed livelihood in terms of financial resources and feeding. Therefore, the challenges must be overcome as soon as possible, for the survival of the carnauba culture itself and for the rural workers to finally enjoy the quality of life they deserve.





A tropical landscape featuring a prominent palm tree in the lower-left foreground. The background consists of a dense, green forest covering a hillside that rises towards the top of the frame. The sky is a clear, bright blue with a few wispy white clouds. The overall scene is brightly lit, suggesting a sunny day.

CHAPTER 3

LEGISLATION

Environmental regulations and legislation

Brazilian environmental laws regulate the general environment in which carnauba extractivism is conducted. This regulatory framework includes the protection of Permanent Preservation Areas (APPs), in which carnauba grooves often grow — since they are frequently part of riparian forests. These regulations also provide for extractivism in Conservation Units (UCs), as well as establish penalty policies in the case of illegal deforestation and arson.



LEARN MORE

Extractivism is the set of practices associated with the sustainable management of natural resources, especially the work of collecting natural products. Extractivism also comprehends the concept of agro-extractivism, which is the “combination of extractive activities with cultivation, breeding and processing techniques. This concerns the diversification, species consortium, the imitation of natural environmental structure and patterns, and the use of techniques developed by research, based on traditional knowledge and practices, as well as the knowledge of ecosystems and regional ecological conditions.” (IN MAPA / MMA No. 17, May 28, 2009).

Table 2, below, shows a brief table summary with some important environmental regulations.

Table 2: National environmental legislation concerning the carnauba productive chain.

LAW	ABOUT	WHERE TO CONSULT
National Environmental Policy, Law No. 6938, of 1981	Governs the preservation, improvement and recovery of life-giving environmental quality, aiming to ensure, in the country, conditions for socio-economic development, the interests of national security and protection of the dignity of human life.	https://bit.ly/1YgMNzS
SNUC Law No. 9985, of 2000	Establishes the National System of Nature Conservation Units - SNUC, establishes criteria and standards for the creation, implementation and management of conservation units.	https://bit.ly/2NzC0Ay
Environmental Crimes Law No. 9605, of 1998	Provides for criminal and administrative sanctions arising from harmful conduct and activities to the environment, and other measures.	https://bit.ly/1L6oaCf
New Forest Code, Law No. 12651, of 2012.	Establishes general rules on vegetation protection, Permanent Preservation areas and Legal Reserve areas; forest exploitation, the supply of forest raw materials, the control of the origin of forest products and the control and prevention of forest fires, and provides for economic and financial instruments to achieve its objectives.	https://bit.ly/1iKaEFk
MAPA-MMA Normative Instruction No. 17 of 28 May 2009	Provides technical norms for obtaining organic products from sustainable organic extractivism.	https://bit.ly/2Yy1RAU

In each state where the carnauba palm tree grows, there are different laws dealing with the subject. Table 3 contains regulations from the states of Ceará and Piauí:

Table 3: Environmental legislation from the states of Ceará and Piauí regarding carnauba chain.

LAW	SUBJECT MATTER	STATE	REFERENCE
Law No. 12488 / 1995	Establishes Forest Policy, requires registration of individuals or companies exploiting products, by-products or raw material originating from forest environment. This registration is renewed annually.	CE	https://bit.ly/1YgMNzS
Decree No. 27413 / 2004	Institutes that the carnauba is the tree symbol of the state and its cutting requires the authorization by competent state organs and entities.	CE	https://bit.ly/2NzC0Ay
Law No. 15224 / 2012	Institutes June 5th as Carnauba State Day, honoring the endemic Caatinga species.	CE	https://bit.ly/1L6oaCf
SEMACE Normative Instruction No. 001/2000	Addresses the obligation of forest replacement for the exploitation, use, processing or consumption of forest raw material. Thus, carnauba forest deforestation requires forest replacement with preferably native seedlings.	CE	https://bit.ly/1iKaEFk
Law No. 4854 / 1996	Establishes that the State Secretariat of the Environment and Water Resources is incumbent to authorize deforestation and other alterations of native, primitive or regenerated vegetation cover and homogeneous forests.	PI	https://bit.ly/2YylRAU
Law No. 3888 / 83	Prohibits the cutting of carnauba palm trees throughout the state's rural territory. Carnauba cutting is only allowed if performed by specialized agencies of the Public, State or Municipal Administration, for reasons of irreplaceable need, in the public interest, justified before the Secretariat of Agriculture.	PI	https://bit.ly/2Kq2YuP
Ordinary Law No. 6328 / 2013	Determines the use of handcrafted paper from carnauba straw in the preparation of diplomas issued by public agencies of the State of Piauí.	PI	https://bit.ly/2KtpGSN
Decree No. 17378 / 2017	Choses the carnauba palm tree as its tree symbol, winning over other species, like: "Ipê Amarelo", "Bacuri" and "Jatobá" in a public people consultation.	PI	https://bit.ly/2Ki75KI

Despite existing rules and laws, business ventures that cause the removal of carnauba grooves are somewhat common. When public interest and the possibility of job creation are aligned with the business endeavor, authorizations for such removal are usually granted by the government. It is, then, up to the competent authorities to ensure compliance with environmental requirements, especially those concerning compensatory replenishment of the protected species, in this case, the carnauba palm tree. Due to its environmental, economic and social importance, it is fundamental to have specific public policies about the production and planting of carnauba seedlings, as well as for the biological control of invasive species, such as the devil's claw.

Access and benefit sharing

The Convention on Biological Diversity (CBD) is an international document signed by over 190 countries. This document presents three major strategies:

- 1- Conservation of biodiversity;
- 2- Sustainable use;
- 3- Fair and equitable sharing of benefits derived from the use of biodiversity.

Benefit-sharing is a mechanism in which the companies that commercially use components of biodiversity (genetic heritage or traditional knowledge associated with genetic heritage) have to share their earnings with the owners of those components.

By establishing the benefit-sharing system, the Convention created the possibility of innovation generated from biodiversity and its associated traditional knowledge generating resources for biodiversity conservation.

In Brazil, the access and the use of genetic heritage, the protection and access to associated traditional knowledge, and benefit-sharing for the conservation and sustainable use of biodiversity, are governed by Law No. 13123, of 2015, and by Decree No. 8772, of 2016.

But, what does it have to do with the carnauba?

Carnauba is a native plant, in other words, it is part of the Brazilian biodiversity, and its use can generate innumerable innovations and products, of the most varied types, such as food, medicine, cosmetic, and wax for the most diverse uses.

Thus, finished products that contain raw materials or traditional knowledge linked to carnauba - since these components

contribute to the main purpose of the product, improving its action or broadening its purposes - or, yet, products that feature declaration of origin or differentiation resulting from carnauba, which are mentioned in any visual media, marketing campaigns or even if those features are highlighted on the product label or with the brand. In all these cases, these products shall be submitted to the benefit sharing policy.

However, the legislation deals differently with certain activities: the production, processing and commercialization of food, beverage, fiber, energy, or planted forests. In these specific cases, the benefits sharing party is the producer of the reproductive material, such as seeds and seedlings for instance, and the manufacturer of the finished product is exempt from the sharing.

Exemption from benefit sharing

- Native Indians, traditional folk and traditional communities and family farmers are free from the obligations set by law (both registration and benefit sharing);
- Small and micro enterprises must register their activities, but are exempt from sharing benefits;
- Intermediate product manufacturers must also register their activities, but are exempt from sharing benefits;
- Family farmers and their cooperatives with gross revenues below 3.6 million reais per year do not share benefits;
- Activities and tests provided for in article 107 of Decree No. 8.772/2016, and when they are not an integral part of research or technological development, according to CGEN (Genetic Heritage Management Council) Technical Guidance No. 9/2018.

How should benefits be shared?

Benefit sharing can happen in two ways:

- **Monetary modality:** in cash, deposited with the National Fund for Benefit Sharing (acronym FNRB).



◦ **Non-monetary modality:** through conservation projects, people training, product distribution and the like.

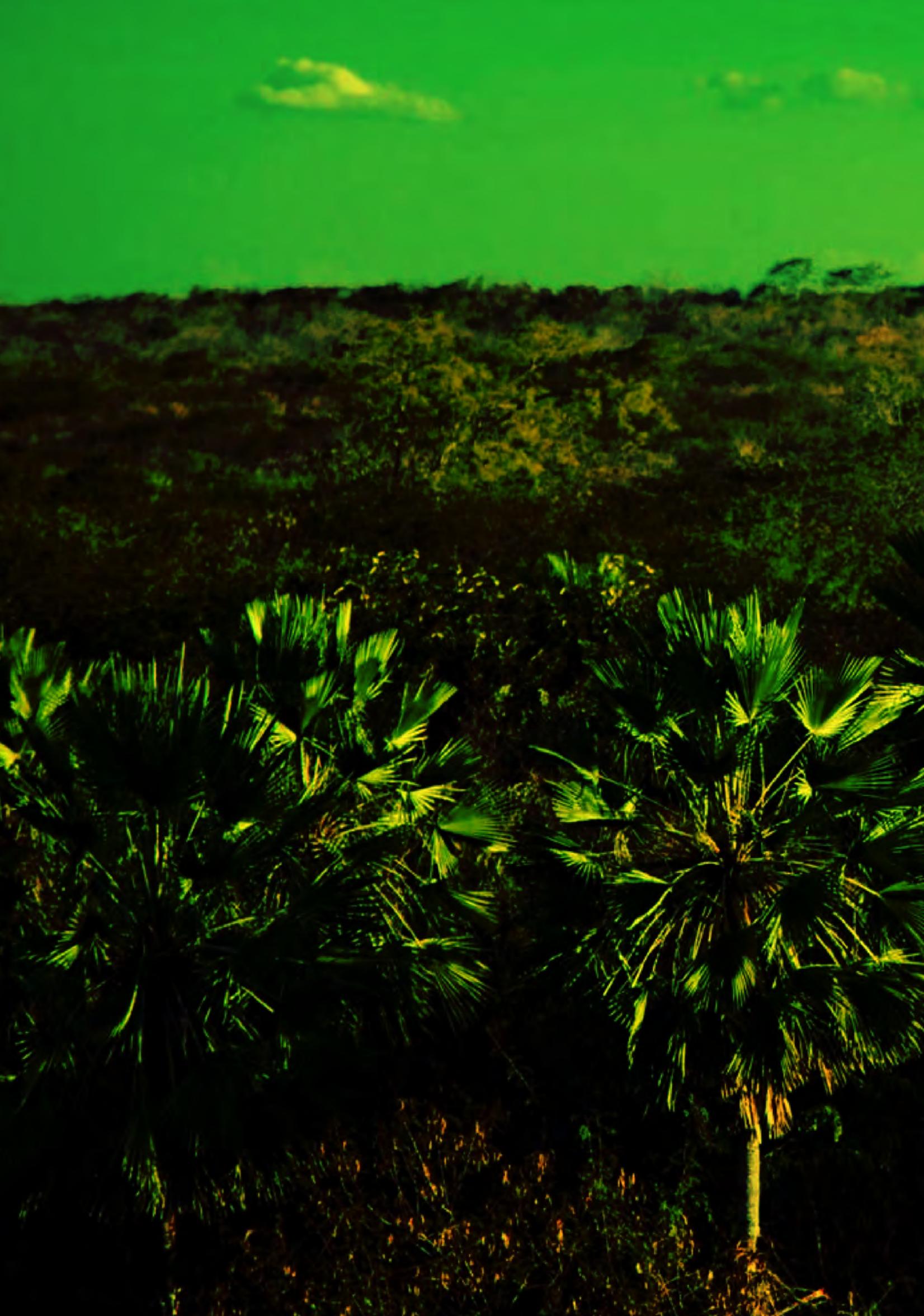
In the monetary modality, 1% of the benefits derived from the exploitation of the finished product or the reproductive material will go to the National Benefit Sharing Fund (FNRB).

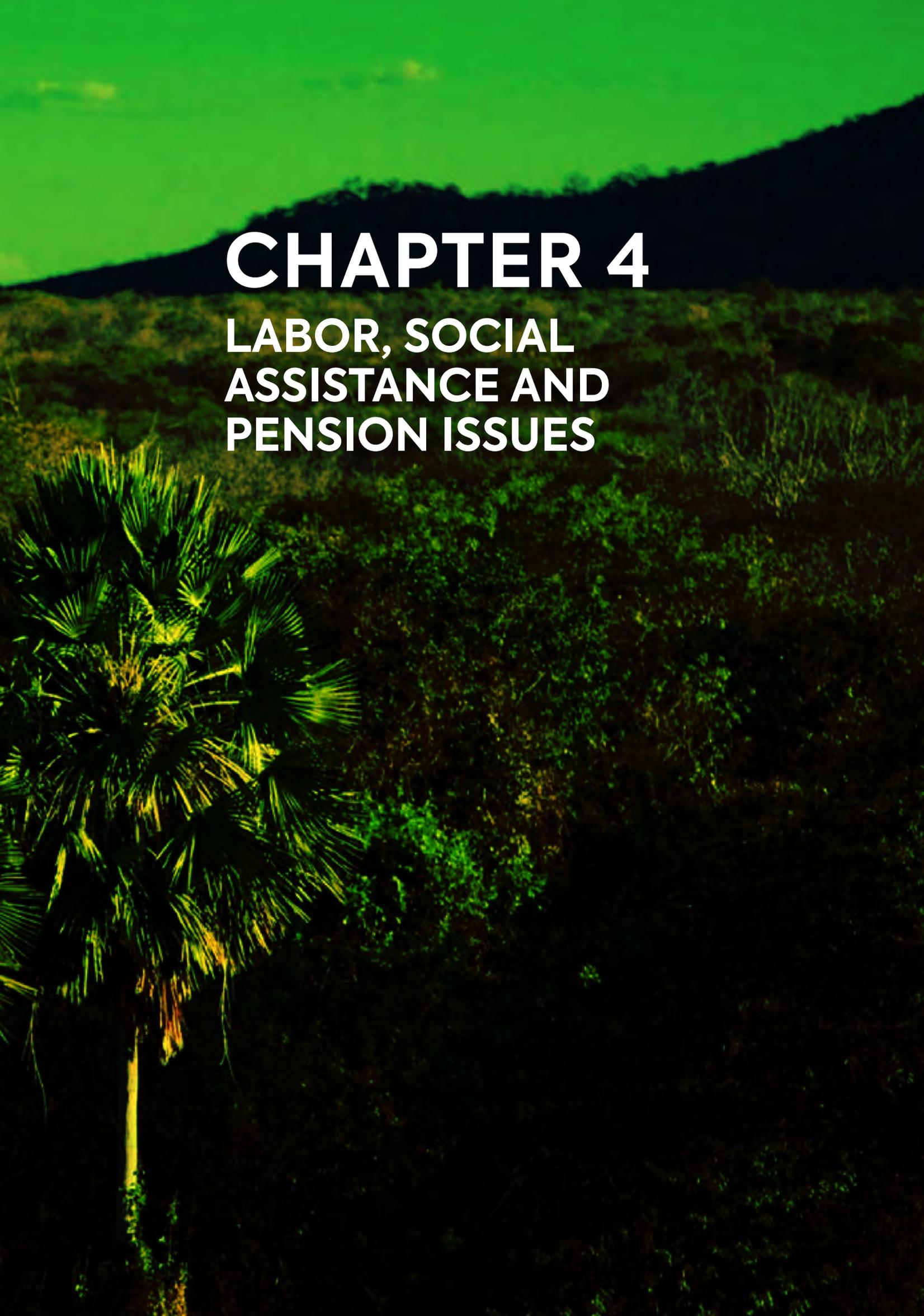
In the non-monetary modality, the amount may vary from 0.75% to 1% of the annual net revenue from the commercialization of the product or reproductive material. This amount may be allocated to Conservation Units (UCs), native Indians lands, Quilombos, rural settlements, traditional territories, research institutions, priority conservation areas, safeguarding traditional knowledge, ex situ collections,

conservation projects, capacity building, distribution of products, among other possibilities.

For registering processes to access genetic heritage and associated traditional knowledge, product notification and monitoring of benefit sharing obligations, consult the National System for the Management of Genetic Heritage and Associated Traditional Knowledge (SIGEN), an electronic system available at the website:

<https://bit.ly/2J4xWrh>



A tropical landscape featuring a prominent palm tree in the lower-left foreground. The background consists of a dense, green forest covering a hillside that rises towards the top right. The sky is a clear, bright blue with a few wispy white clouds. The overall scene is brightly lit, suggesting a sunny day.

CHAPTER 4

LABOR, SOCIAL ASSISTANCE AND PENSION ISSUES

Regularization of employment relations

Regularizing employment relations is indispensable because it guarantees employees their rights concerning employment, retirement and social security, and employers are assured their business social role is properly conducted. Compliance with legal requirements allows employers to securely and legally perform their activity in the field, as well as gives workers conditions to perform their work with dignity and respect (Table 4).

Table 4: Advantages for employers and employees.

EMPLOYER	EMPLOYEE
Avoid the risk fines for breaching labor laws*	Guaranteed labor, social security and pension rights, such as: Vacation, 13th Wage (or proportional), additional 1/3 Vacation Pay.
Make sure that the INSS will be responsible for covering the period when the worker is licensed for any reason, except for holidays.	Guaranteed benefits when you are unable to work, such as: sick pay, work accident allowance, retirement by age, by time of contribution or by disability, death pension, among others.
Reinforce the social role of the activity and its benefits for society.	A signed employment record book (CTPS) also serves as proof of length of service for retirement purposes.

*Consolidation of Labor Laws (CLT): Decree-law No. 5452, of May 1, 1943, amended by Law 13467, of July 13, 2017.

ATTENTION

To regularize employment relations, employers should consult an accountant or lawyer. To this end, employers may seek assistance from their local union or their preferred professional.



CONTRACT TYPES:

With the arrival of the new Law No. 13367, of 2017, the so-called labor reform, employees can be hired in the following ways:

Crop Contract - Law No. 5889, of 1973.

- Characterizes, by a fixed term contract, enough time to engage temporary activities, depending on the seasonal variations of the agrarian activity itself. The CTPS (employment record book), must be signed, with one extension allowed. The workday for crop contract workers is the same as is applied to the other general employees, in other words, 8 hours a day, limited to a 44-hour work week. In this type of employment, at the end of the harvest, the employee is entitled to (one twelfth (1/12) of the monthly wage, per month of service or fraction thereof superior to 14 days).

Intermittent Contract - Article 452-A and following articles under the CLT

- Provision of services, with non-continuous subordination, occurring with alternating periods of service and downtime, determined in hours, days or months, regardless of the type of employee and employer activity. Employees may have their CTPS signed by several different employers, upon being paid proportionally for the time worked. The

hourly wage for work may not be less than the proportional hourly sum of the current minimum wage.

Part-Time Contract - Article 58-A under the CLT

- a) Work that endures no more than thirty (30) hours per week, disallowing any additional weekly hours, or b) Work that endures no more than twenty-six (26) hours per week, allowing for no more than six weekly supplementary hours.

At Will Contract

- This type of contract that has no termination date.

! ATTENTION

Contracts commonly known as “empreitada” or “impeleita” (“freelance agreement”), are not provided for under Brazilian law, and may not be used in the carnauba productive chain.

In every type of contract, the employee’s CTPS must be signed by the employer, and upon completion of activities, the termination of the employment relationship must be formalized and registered in the CTPS. After this, the employer will have ten days to pay any severance, in accordance with article 477(6) of the CLT, under penalty of payment in favor of the employee, in the amount equivalent to their wage, with proper monetary correction, unless it is proven the worker caused the delay.

HIRING STEP-BY-STEP PROCESS



LISTING AND REGISTRATION

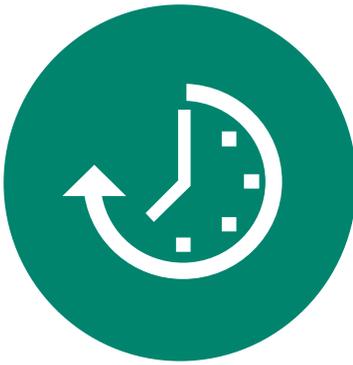
For Individuals: Register a CPF under the Brazilian Federal Revenue Service and create an e-CAEPF - Economic Activity Registry for Individuals, on the Brazilian Federal Revenue Service and the e-Social websites.

For legal entities: Constitute a business register at the State Board of Trade, the Brazilian Federal Revenue and the State Treasury.



HIRING

This is the time to sign the employment record book and to run an e-Social check. The National Code of Economic Activity (CNAE) number for carnauba workers is 0220-9 / 99. The Occupation Brazilian Code (CBO) number 632325 should be used, which identifies the carnauba worker.



START OF ACTIVITIES

After the employee registration process, employers must comply with all work routines, under the constant direction and supervision of an accountant.

General instructions for employers and workers in the extraction stage

Once workers' employment rights have been guaranteed upon formal contract and a duly signed CTPS in the preparation stage, it is time to raise other employment rights that must be guaranteed by all employers.

ATENÇÃO

I- Provision of sanitary and abundant potable water;
Thermoses with potable water for workers and individual eating utensils in case the shift must have meals in the field.



Image 27: Thermos, individual plates, cutlery and glasses

II- Free provision of appropriate tools for the work, which are also adapted to the physical characteristics of the worker;

III- Adequate lodging with good sanitary conditions for workers from other locations, who are required to stay at or near the workplace;

It is important that dormitories be clean, well-ventilated, well-lit, and afford good general infrastructure. It is recommended that collective agreements between producer unions and workers' unions include regional adaptations such as the use of hammocks in the dorms, the use of eco-efficient wood stoves for cooking and other measures to adapt to the local reality.



Image 28: Housing Model. Source: <https://bit.ly/33cgkDJ>

IV- Provision of shelters on work fronts, fixed or mobile, which are able to protect workers from the weather during the meals.

Providing a basic first aid kit in the work environment is also recommended to ensure some assistance in case of occupational accidents. It is important to have a qualified person to handle the kit and perform first aid care. A good kit should have: Tweezers, scissors, surgical gloves, face mask, goggles, cooler bags (hot and/or cold), gauze, tape, band aid, crepe bandage, saline or iodine solution, merthiolate, cotton swabs, antiseptic, sealing plastic bag and female maxi-pads. Oral medicine in the first aid kit are prohibited by Article 25 of Decree 20931 at a company without a health professional on the staff.



Imagens 28: Abrigo e pia móveis; barraca e assento sanitário móveis | Fotos: Pontes Ind. e Com. Ltda.



LEARN MORE

Solid waste and garbage

It is important that the shifts always have the means to dispose their waste. All waste that is produced during the extraction activity must be properly stored in plastic bags and separated by type, at least plastics, paper and metals separated from food waste. Proper disposal shall be conducted at the nearest landfill, or with the support of recyclable waste picker cooperatives. At the end of productive activities in the carnauba groove, the environment should be as clean as or better than before. Therefore, producers need to advise all hired workers about material disposal procedures in the carnauba groove, and offer their employees the means to separate and dispose generated waste.

Special Social Security and Rural Retirement

The Brazilian Social Security System offers different treatment to rural workers who perform activities individually or in family units, without the use of permanent employees, which is known as rural retirement. Mandatory service time and minimum age for retirement are shorter comparing to general social security rules.

TABLE 5: TYPES OF SPECIAL SOCIAL SECURITY.

Condominium member	Explores rural property, with or without delimited area, in which the property is a common asset, belonging to several people.
Settler	As a beneficiary of land reform policy actions, develops agricultural, pastoral or horticultural activities in the settlement of areas.
Partner	Subject to a partnership agreement with a landowner or tenant and develops agricultural, pastoral or horticultural activity, on sharing profits or losses.
Land Lending Party	By agreement, exploits land belonging to another person by free loan agreement, for a set or unspecified time, to develop agricultural activity.
Rubber Tapper or Vegetable Extractor	Exploits the activity of collecting and sustainably extracting renewable natural resources as their main livelihood.



ATTENTION

For the workers who are specially categorized for rural retirement purposes, it is important to remember that their contracts cannot exceed 120 days per year.

If the contract exceeds this limit, the worker will be disenfranchised from the condition of having a special social security and the benefits related to rural retirement. For more information, consult your state Federation of Agriculture, the Rural Workers Union, SEBRAE and SENAR, or the Ministry of Economy.

“Bolsa Família” (Family Assistance Program)

Many of the active rural workers in the carnauba extractivism are beneficiaries of the “Bolsa Família” Program. In case their income during the harvest season exceeds the limits that characterize poverty and extreme poverty, they lose their right to access this benefit.

However, the right to this subsidy can be regained after the harvest period, when the employment relationship is terminated and registered in the CTPS. For this, the rural workers must go to the appropriate public office in their city, usually at City Hall, and reapply for assistance from the “Bolsa Família”.

 **LEARN MORE****TAC - TERMS OF CONDUCT ADJUSTMENT**

The Terms of Conduct Adjustment Term is a document used by Brazilian public bodies, especially by the Public Prosecutor's Office (MP). The TAC signatory agrees to adapt to a new conduct before any of these bodies. According to Law No. 7347 / 85, article 5; CDC (Consumer Defense Code), article 82, the TAC may be proposed by any public body entitled to file public civil claims, such as the Public Prosecution Office, the Public Defender's Office, the Federal Attorney's Office, Federation States, Municipalities, autarchies and public foundations.

The Terms of Conduct Adjustment in the carnauba productive chain is an agreement between the Labor-Related Public Prosecutor's Office (MPT) and any actor of the chain, in which the latter party agrees to comply with labor legislation and occupational health and safety standards, under penalty of paying a fine.

If the party fails to comply with its commitment, the Labor-Related Public Prosecutor's Office may file public civil claims for the fulfillment of the obligations assumed in the agreement.

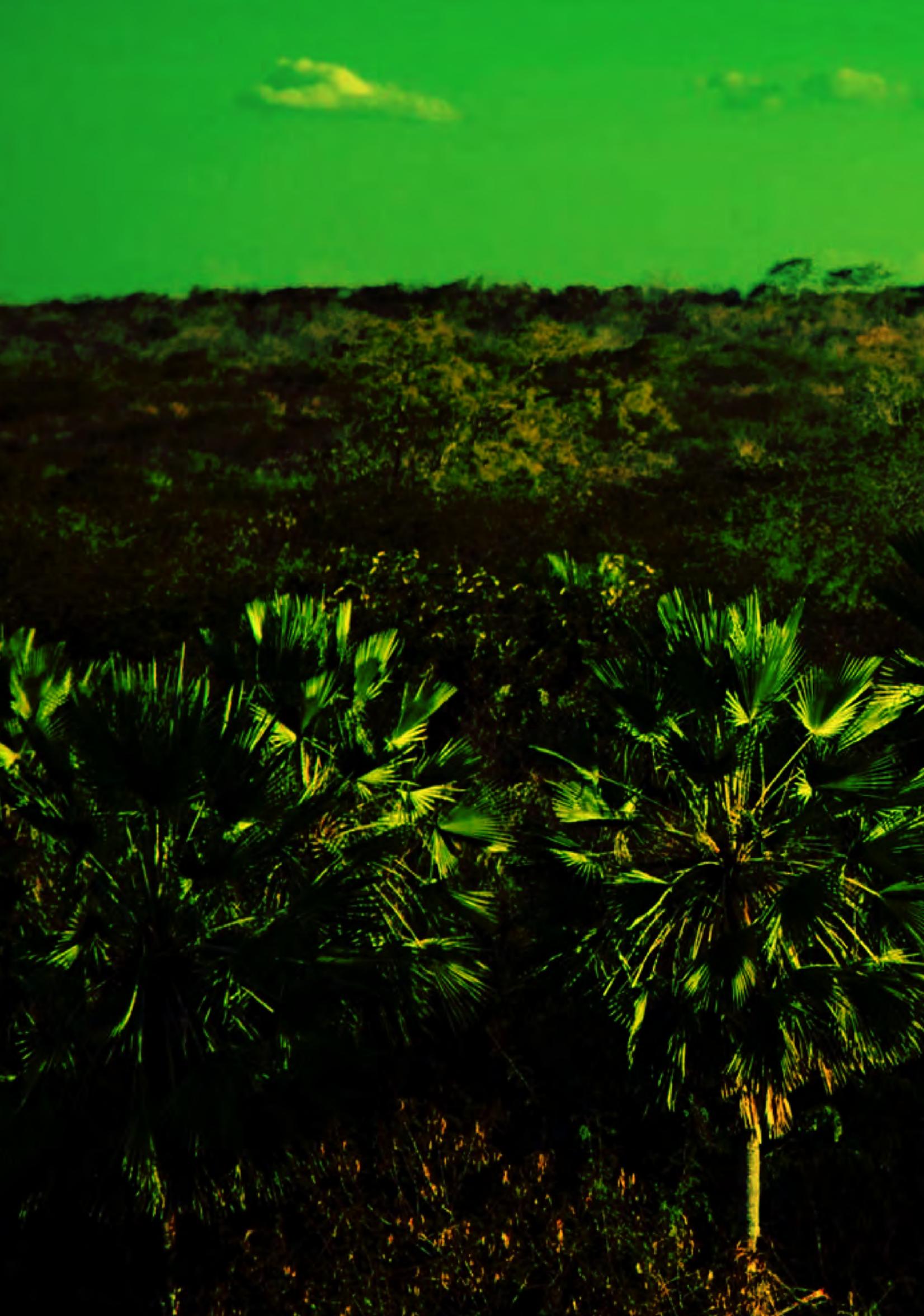
The TAC was proposed by the MPT as a result of the "Palha Acolhedora" project. The MPT began its actions in 2014 and identified workers without signed CTPS and living and working in degrading conditions, in precarious housing, without potable water, toilets and suitable cooking facilities.

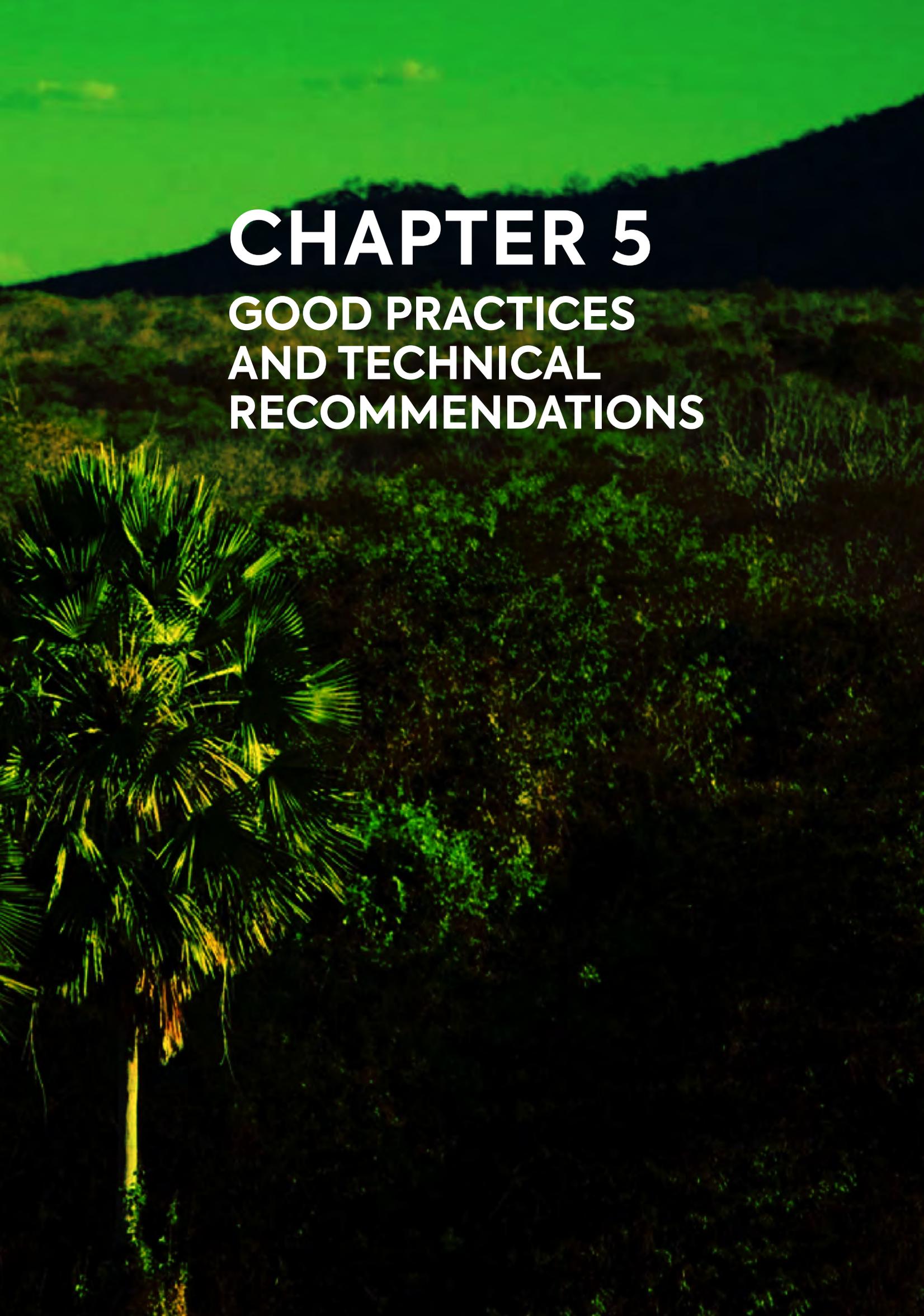
One of the TAC clauses provides that companies should refrain from buying or commercializing carnauba powder or wax from any individual or legal entity caught by the Ministry of Labor (MTE) or MPT inspections, directly or indirectly exploiting straw extraction activity, or producing/processing carnauba powder without the necessary employment paperwork, in degrading or slave-like working conditions.

In addition, the TAC stipulates that signatory companies undertake to inspect, directly or through third parties, the properties explored, in order to determine compliance with labor obligations. The inspections must be conducted annually and embody reach no less than 25% of the company's total suppliers. In addition, companies must form a list of reliable suppliers, with the information provided by the latter, when purchasing their products.

The commitment to the TAC is optional, there is no obligation for the actors of the carnauba production chain to sign it. It is up to each one to make this decision. However, the refusal to sign the TAC does not prevent the sector to update and improve itself to ensure the existence of the production chain, since the foreign market is aware and increasingly careful in the purchase of the product.







CHAPTER 5

GOOD PRACTICES AND TECHNICAL RECOMMENDATIONS

In this chapter we will show how the most common production arrangements in the carnauba production chain works and what the technical recommendations and best practices for each actor are. The recommendations given in this manual stand in accordance with Law No. 5889, of 1973 and with Decree No. 73626, of 1974.

The following flowchart shows all the steps in the chain: **Preparation, Extraction, Industrial treatment and Processing.**

Each of these steps will be detailed with all the respective processes and actors involved. It is noteworthy that the roles within the carnauba chain are not mutually exclusive, so it is very common for the same individual to perform several roles.

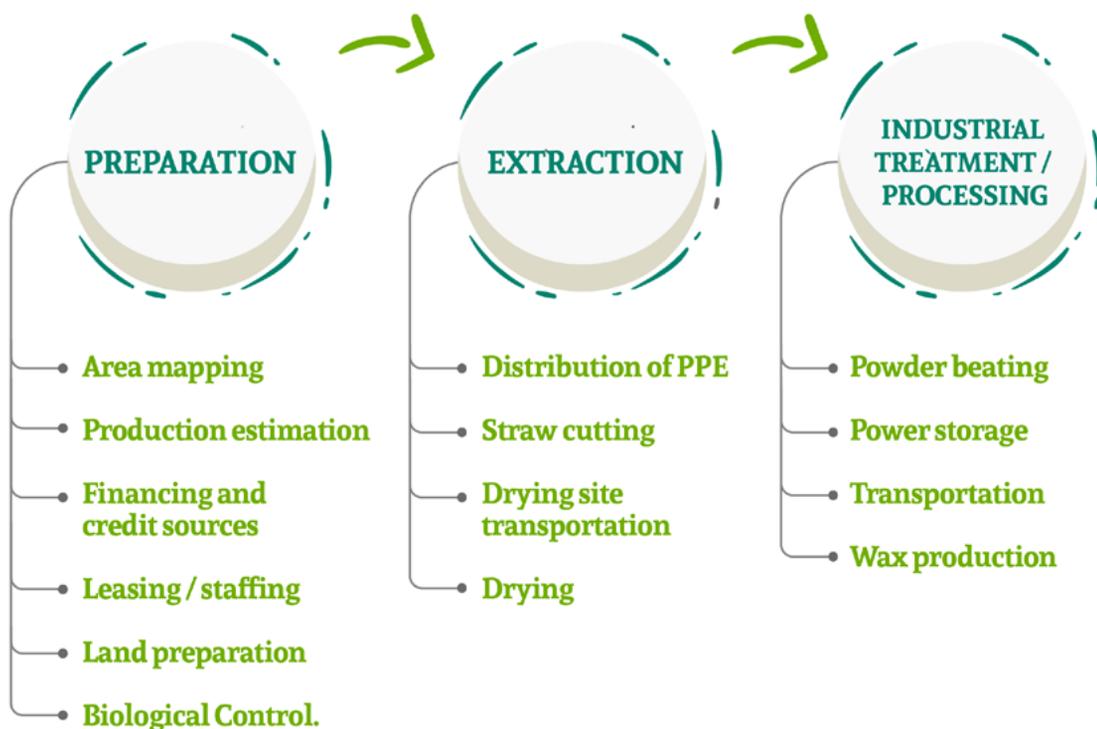


Image 29: Stages of carnauba production process. Source: Caatinga Association Collection.

Preparation stage



Preparation is the first step of the carnauba extractivism chain. The processes include: Area mapping, production estimation, financing and credit sources, area selection / leasing, staffing, land preparation and biological control.

Check the best practices that can be incorporated to improve processes and make them appropriate to what is required by law.

Mapping the carnauba groove

Mapping production areas can bring many advantages for owners and producers, to improve knowledge about area productivity and assist in carnauba groove carnauba forest management and maintenance activities. Mapping information can help in controlling biological infestations, improving the use of machinery and labor, estimating production, as well as implementing measures to increase productivity and reduce environmental damage.

A tool that can be used to assist in mapping areas is sketching, a schematic drawing of the existing points of interest in an area. It can be a handmade drawing containing the main elements of the terrain as per the example below. This tool is used to have a graphic notion of the area and to assist the producer in decision making, besides helping to organize the harvest, optimizing time and work effort.

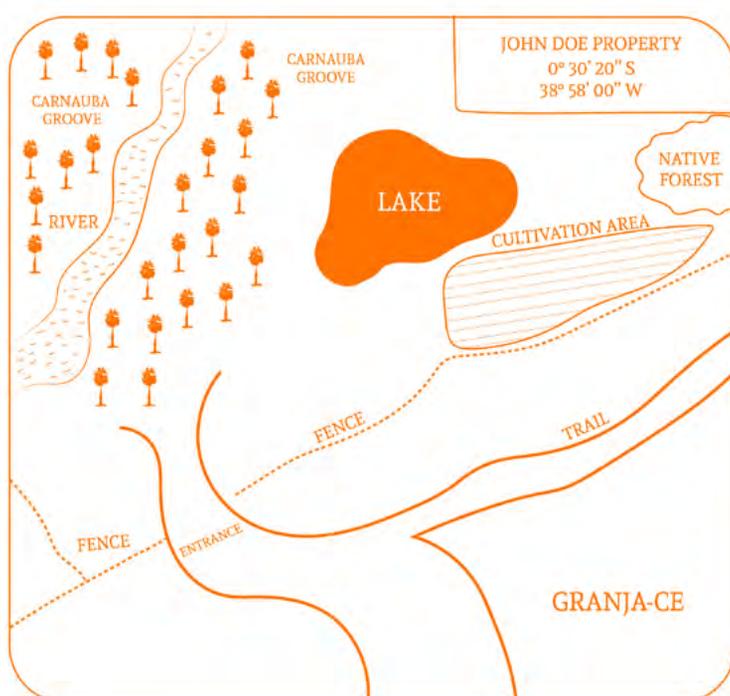


Image 30: Sketch template for mapping the areas.. Source: Associação Caatinga

FICHA DE IDENTIFICAÇÃO DO CARNAUBAL/PRODUTOR	
IDENTIFICAÇÃO DO PRODUTOR	
Nome: _____	
RG: _____	CPF: _____ DAP (se cabível): _____
Contato telefônico: () _____	E-mail: _____
Identificação do carnaubal:	
Município/Estado: _____	Localidade: _____
Possui () Nome do posseiro _____ Pequena propriedade rural: () Nome do proprietário: _____ Assentamento Rural: () Nome do assentamento: _____	
Acordo de uso do terreno: Arrendamento () Meior () Produção coletiva/familiar ()	O carnaubal está próximo a alguma Unidade de Conservação (Reserva, Parque, Estação Ecológica)? Sim () Não () Se sim, qual? _____
Nome do proprietário: _____	
Contato do proprietário: () _____	Tamanho da área de manejo em hectares: _____
Quantidade estimada de Carnaubas produtivas: _____	Quantidade estimada de milheiros de palha no carnaubal: _____
Quantidade de pó por milheiro(Kg):	Quantidade de pó total no carnaubal (Kg):
Pó olho _____(Kg)	Pó olho _____(Kg)
Pó mediana _____(Kg)	Pó mediana _____(Kg)
Outro _____(Kg)	Outro _____(Kg)
Quantidade de cera por carnaubal caso aplicável (kg):	Existem caminhos e estradas de acesso às áreas de coleta?
Tipo de cera _____(Kg)	Sim () Não ()
Tipo de cera _____(Kg)	Se sim, quantos? _____
Tipo de cera _____(Kg)	

Image 31: Form sheet for property mapping and production estimation. The Form template is in Annex 1, at the end of the manual, for consultation and / or printing.

In some cases, GPS and map software applications can be used to get a more accurate map of the area, indicating the geographical coordinates of specific terrain points, such as a tree, a fence, a house, or a river. Free digital applications can also be used, such as Google Maps, which uses georeferenced satellite imagery, allowing the building of maps, characteristics from areas on the computer screen to be identified and the possibility of adding markers to them.

As part of the mapping process, information from each carnauba groove should be gathered to acquire the attributes and specificities of each mapped area. The information can be gathered on a form sheet, according to the model above.

This information will be useful for establishing lease agreements, as well as assigning the origin and quality information about the product coming from these areas.

Estimated production

Estimated production is used to guide the negotiation between carnauba groove producers and owners, and to provide a more realistic estimate of the yield, costs and revenue to be obtained from the harvest.

For this calculation, the tenant will take into account some factors already assessed in “Mapping the carnauba groove”, such as:

- Carnauba groove productivity: estimated straw (in thousands) per area;
- Average carnauba groove height: the shorter, the better the efficiency of the straw cutting.
- Carnauba groove access and “cleanness”: the presence of weed and other materials in the carnauba groove transit areas;
- Carnauba groove spacing: the more spaced, the lower the production efficiency;
- Soil type: flooded or salinized soils have palm trees that produce higher amounts of ceriferous powder;
- Carnauba groove rest time: More recently explored carnauba palm trees have less time to replenish foliage and therefore produce less.



Image 32: Green carnauba groove. Source: Documentary Bioeconomics.



Image 33: Mature carnauba groove. Source: Samuel Portela.

Financing and credit sources

The informality in the carnauba production chain goes beyond labor relations and is also present in the sources of credit and financing. In this scenario, appears the recurring figure of the “loan shark”, who gives loans in a less bureaucratic way than financial institutions, but with high interest rates.

ATTENTION

This type of loan needs to be assessed carefully. Some interest rates are considered abusive and illegal. Therefore, it is recommended that producers search for available small farmer credit lines provided at financial institutions such as banks. These institutions offer credit lines like PRONAF (National Program for Strengthening Family Farming), which are adequate to the needs of rural producers who want to invest in their agribusiness and increase their agricultural production.

Carnauba forest tract Lease Agreement

Finally, after the first stages of preparation, it is time to execute a lease agreement, which is the predominant mode for carnauba extractivism. It is recommended that these agreements be formalized by contracts, ensuring greater legal certainty for the landowner and the tenant producer. A specific lease agreement template for the carnauba chain can be found on the FAEC's website (<https://bit.ly/2GRT6Jk>).

From there on, the next step is hiring people to work at the carnauba groove. Hiring workers upon a signed CTPS, detailed in the previous chapter, is also part of the preparation stage.

There are experiences of Piauí cooperatives where small producers come together to get better conditions in lease agreements, i.e. in the purchase of supplies and the contracting of services (including accounting), as well as the sale of the product to the industry.

Hiring staff

Hiring personnel should proceed in a way that the employment relations and labor rights be respected, as previously discussed in chapter 4 of this manual (“LABOR, SOCIAL ASSISTANCE AND PENSION ISSUES”). The regularization of employment relations gives workers the means to perform their duties with dignity and respect, guaranteeing their labor, social security and pension rights, in addition to providing employers the legal certainty necessary to perform their activities.

Land preparation and biological control

To facilitate access and transport for workers and equipment, it is important to keep clean the traffic areas within the carnauba groove. To do so, during the process of preparing the areas, weeds must be cut and logs and branches must be removed, which may pose a safety hazard to workers.

Among the species that should be controlled in the work areas, is the devil's claw (*Cryptostegia madagascariensis*), a Caatinga non-native creeper originating from Madagascar Island, Africa. First introduced in Brazil as an ornamental plant, it has become an invasive species with high potential to ecologically imbalance the semiarid regions in Northeastern Brazil.

The fast-growing devil's claw begins reproduction in its first year of life, producing a large amount of seeds, which are quickly spread by wind, water or animals (Starr et al., 2003). These seeds remain viable for up to one year and some studies have shown that effective germination rates range from 90% to 95% (Starr et al., 2003; Vieira et al., 2004).

The devil's claw has the ability to spread rapidly along watercourses, coastal forests, grasslands, forest edges and degraded areas, forming dense structures that cover trees and palm trees, with the capacity to suffocate and thus kill extensive areas of forest. In addition to rapid growth, the devil's claw produces a latex that irritates human skin, making it even more difficult to control by conventional methods



Image 34: Flowers and leaves of *Cryptostegia madagascariensis*. Source: Samuel Portela



Image 35: Specimens of carnauba suffering from devil's claw attack. Source: Samuel Portela.

In studies conducted over the years, observations show that new areas become rapidly affected and there is an increase in the population density of this plant in areas already affected.

In view of this serious threat, a network of partners, involving researchers and institutions from Brazil and abroad, was formed around the devil's claw biological control project. The project is funded by ADECE, Sindicarnaúba and SC Johnson, and is carried out in partnership with the Caatinga Association, UFC, UECE, UFV, UEFS and CABI, with the aim of researching and identifying a biological agent capable of controlling the invasive species advance in the natural environments of the Caatinga.

The project builds on successful control experiments carried out in Australia, in addition to counting on the knowledge from CABI (the International Center for Agricultural Bioscience) in England, which is a reference center in biological control in England.



Image 36: Fruit of the species *Cryptostegia madagascariensis*.Foto: Louisa Lösing

By causing serious environmental impacts, devil's claw infestations are progressively destroying the natural populations of carnauba.

STEP BY STEP DEVIL'S CLAW CONTROL

1

IDENTIFICATION OF THE INFESTED AREA

Accurately mapping all infestations on the property is an ideal starting point that will provide the information needed to identify infestations for priority control. Infestation points should be indicated on the sketch or area map.

2

PRIORITIZING CONTROL AREAS

First, peripheral or small infestations should be targeted to then continue working towards the center of the infestation, especially in areas of agricultural, cattle-raising or extractive production. It is important to prioritize infestations that may be a source of seed dispersal, such as in areas near rivers, and very windy places.

3

SEASON AND METHOD OF CONTROL

In order to reduce costs and respect nature, it is important to choose the correct season and methods to be used. The most suitable season for control is after the rainfall peaks. Thus, it is possible to eliminate the devil's nail before it produces flowers, fruits and seeds. First, the available resources, such as labor and machinery, must be assessed. In addition, methods that do not use fire should always be prioritized, avoiding impacts on the ground and the risk of arson. When considering the use of fire, be sure to have equipment and trained personnel, as well as the appropriate environmental permits.

For mechanical control using hand tools, shallow cutting should be conducted, eliminating all the plants. One of the advantages of this method is that other native plants can be spared, since the cut is selective.

Mechanical control with the use of a tractor is indicated for more spaced-out carnauba grooves, opening paths or even removing the entire plant. The disadvantage is that with the machine, occasionally native plants are also removed in the process.

After cutting, the removed plants can be spread over the land as mulch, only if they have not yet formed seeds. Follow-up manual control with adequate tools, like a pickaxe, a hoe or the like for hoeing smaller plants and sprouts from the uprooted specimens must be performed over the area in the following months.



LEARN MORE

IMPORTANT TIPS FOR DEVIL'S CLAW CONTROL OPERATIONS:

- Collect the seeds and the plants so that they do not spread;
- Take the precaution of wearing protective gloves and long-sleeved shirts to avoid burns from the latex substance;
- After weakening the plant, through shallow cutting, it is possible to dig up the plant to remove and separately burn the roots to avoid regrowth;
- Chemical control (herbicides) is not recommended as their use may contaminate the carnauba wax that will be used in the future in cosmetics, food and pharmaceuticals;
- If fire is used for total elimination of the plant, the invasive specimens must be cut and piled in rows or small circles (no more than 1.5 meters high and at least 3 meters away from the carnauba palm trees to avoid the risk of spreading sparks); - Authorization must be previously requested from the environmental authority and the area should be observed in the following months to remove any regrowth of the devil's claw, when mechanical management is much more simple to perform;
- The use of fire in agriculture, even when controlled, poses risks mainly to small carnauba grooves, mostly in the semi-arid region. Where the climate is dry and there are winds, fire spreads easily and may reach unwanted areas. In addition, burning also affects young carnauba palm trees that, due to their small size, are eventually harmed.

For information on controlled burning and burning authorizations, contact PREVFOGO (IBAMA) by telephone at +55 (61) 3316-1858, +55 (61) 3316-1844, or by e-mail: prevfogo.sede@ibama.gov.br

Or access the website: <https://www.ibama.gov.br/prevfogo>.

You can also contact the state environmental agency, in Ceará, SEMACE toll free at 0800 275 2233 or by website at <http://www.semace.ce.gov.br>, and in Piauí, SEMAR by telephone at +55 (86) 3221 4745 or by website at <http://www.semar.pi.gov.br>.

Learn more about Integrated Fire Management at <http://cerradojalapao.mma.gov.br/mif>





Extraction phase



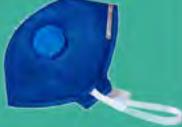
The extraction stage entails providing Personal Protective Equipment (PPE), cutting leaves and palm stalks, transporting leaves and stalks to the drying site and proper disposal of the straw at that site.

At this stage, special attention should be given to using the recommended PPE for each function performed in the process and to providing a healthy work environment to ensure decent working conditions.

Distribution of Personal Protective Equipment (PPE)

Workers are required to use PPEs, which must be provided by the contracting producers. Equipment instructions must be observed, and workers properly trained. The durability/working life/validity date of each piece of equipment must be observed and replaced whenever necessary. PPE distribution and replacement must be monitored by the chief contractor, who is usually an experienced professional, responsible for organizing the shifts in the field. The chief contractor is also responsible for monitoring other processes, such as the registration of workers and the provision of adequate structures in the field.

The chart on the next page shows the list of Personal Protective Equipment recommended per extraction function.

<p>PPEs</p> <p>Profession</p>	 <p>Straw Hat or Legionary Cap</p>	 <p>Protective Goggles</p>	 <p>Pff2 mask with air filter</p>	 <p>Glove</p>	 <p>Nitrile Glove</p>
"VAREIRO" (SICKELMAN)	✓	✓		✓	
"COLHEDOR", (TRIMMERMAN)	✓	✓		✓	
"COMBOIEIRO" (CONVOYMAN)	✓	✓		✓	
"LASTREIRO" (STRAW-TURNMAN)	✓	✓	✓	✓	
"BOMBEIRO"	✓	✓			
DRIVER					
DELIVERYMAN	✓	✓	✓	✓	
KNOT CUTTER	✓	✓	✓	✓	
OPERATOR	✓	✓	✓		✓
BEATER		✓	✓	✓	
PRESS-COOKERS		✓	✓	✓	
COOKS	✓				



Safety Boot

Trousers

Long sleeve shirts

Earmuffs or Ear Protector

Non-ionizing sunscreen from FPS 30

Scrap leather Apron



Straw cutting

Straw is cut by a professional called a “vareiro” (a sickelman), who usually has the most experienced in the shift, having already worked in the other functions. The activity entails cutting the palm straw stalk by using a sickle attached to the end of a pole, while making sure that the straw does not fall on himself. To do so, the professional stands upwind and looks up carefully.

The “vareiro” should take regular rest intervals to relax his neck and the back muscles, since the activity involves handling heavy tools while constantly looking upwards. In addition, wearing sunglasses is essential to protect their eyes from the sun’s rays.

It is important to properly select which straw stalks to cut, preserving the growing point at the tip of the palm, known as “mangará”, since its cutting can lead to the death of the palm tree.

Once cut, the straw stalks are collected by the professional called “aparador” (trimmerman), who must always be careful and wait for the “vareiro” (sickelman) to finish cutting the stalks to begin its collection. When collecting straw, the trimmerman cuts off the straw from the leaf stalk and separates the open (older) leaves from the closed (younger), so-called “eye” leaves. This is done because each of the two types of straw will produce different waxes. “Eye” leaf wax is cleaner and more valuable than the wax generated from the already open leaves.

When collecting the straw, the trimmerman’s knife or machete should always be sheathed and worn outside the garments, and ergonomic concepts should always be observed when working. It is important for all workers to bend their knees, instead of their backs, when lifting the straw. After the trimmerman, the straw is bundled together by the so called “junteiro” (threadman).



Image 37: “Vareiro” (sickelman). Source: Samuel Portela



Image 38: "Mangará" of the carnauba palm tree after straw cutting. Source: Sandino Moreira



Image 39: Open and closed "eye" leaf. Source: Sandino Moreira Silva



Image 40: "Aparador" (trimmerman) and "Junteiro" (threadman). Source: Caatinga Association.

Transporting to the drying site

Once assembled in bundles, the straw is placed in a shackle on an animal's back (mule or donkey) by a professional called "comboeiro" (convoyman), with the necessary precaution not to overload the animal. Once loaded, the straw is transported to the drying site. Once loaded, the straw is transported to the drying site.



Image 41: "Comboeiro" (convoyman). Source: Caatinga Association Collection.

At the drying site, the straw is spread evenly and carefully to avoid the loss of ceriferous powder. A mask should be worn while performing this activity to avoid dust inhalation. Domestic animals should not be allowed in that site.

The straw can be dried outdoors or in yards, in structures such as pole lines, where the straw bundles are extended 30 centimeters from the ground, avoiding direct contact with impurities (Table 6).

Table 6: Advantages and disadvantages of yard drying

BENEFITS	DISADVANTAGES
<ul style="list-style-type: none">- Yield increased 15% with reduced powder loss caused by wind and straw tossing by the "lastreiro" (straw-turnman);- Straw does not get wet;- Avoids mixing with soil particles;- Straw does not rot if it rains;- Occupies little space;- Reduced labor.	<ul style="list-style-type: none">- Drying time increases from 10 to 15 days (SEBRAE, 1994);- Solar dryer is the most efficient practice for straw drying.



Image 42: "Lastreiro" (straw-turnman). Source: Caatinga Association Collection

Solar Dryer - Productivity and Yield

During the drying process, as in other production steps, large amounts of ceriferous powder are lost. The solar dryer is fully covered and the straw is protected from the wind and from contact with the soil. Consequently, there is a significant reduction of powder loss. The increased average yield from reducing the loss is 30% when compared to other drying methods.



Image 43: Powder loss in the beating process. Source: Caatinga Association Collection.

The dryer is similar to a plastic greenhouse, featuring a central tower and a metal framework surrounded by a plastic canvas. The exhaust fan at the top draws out the moisture from the leaves. The straw is hung on cables extended from the central tower to the side columns.



Image 44: Metal framework of a solar dryer. Source: SDA.



Image 45: Assembled solar dryer. Source: SDA.

A coffee bean harvest machine is adapted to extract the carnauba powder.



Image 46: Stretched-out straw on the pole line inside the solar dryer. Source: Caatinga Association Collection.



Image 47: Coffee bean harvest machine. Source: bit.ly/2QBoy4S

Table 7: Increased powder extraction efficiency compared to the traditional method (by each thousand straws).

SPECIFICATION	TRADITIONAL SYSTEM (Kg)	SOLAR DRYER (Kg)	PRODUCTION INCREASE (%)
Powder production	5,5	7,2	30
Yield and wax	3,5	5,5	57
Yield (%)	64	76	-

Table 8: Amount of increased gross production using solar dryer

DRYING SYSTEM	POWDER YIELD (Kg)	POWDER PRODUCTION (Kg)*	GROSS VALUE (R\$)**	GROSS INCOME INCREASE (R\$)
Tradicional	5,5	4.400	36.520,00	-
Secador Solar	7,2	5.760	47.808,00	11.288,00

(*) Processed straw - 800 thousand / year

(**) Price of straw powder - R\$8.30 / kg (November / 2017)

The amounts mentioned above are from November 2017. For more current data producers can access the CONAB website www.conab.gov.br/



LEARN MORE

ADVANTAGES OF THE SOLAR DRYER OVER THE TRADITIONAL METHOD

- Increased yield and quality of carnauba wax and ceriferous powder;
- Added product quality for better competition in the market;
- Lessens the work in the drying process since there is no need to turn over the straw;
- Improves the technical knowledge of the carnauba producers;
- Develops the carnauba productive chain, contributing to job and income generation;
- Improves the working conditions for the communities involved;
- Integrates the extractivists in the process of socio-biodiversity;
- The straw does not need to be crushed (as in other drying processes) and can be used to produce carnauba handicrafts, in addition to the traditional use as fertilizer and mulch.

DISADVANTAGES OF THE SOLAR DRYER OVER THE TRADITIONAL METHOD

- Work shifts, albeit small, can collect from 40 to 50 thousand straw leaves per day. Due to the maximum capacity of each dryer, the collection routine would need to be redesigned, or the straw would have to be stored before the drying and beating processes;
- This is not feasible for producers who collect millions of straw leaves. A fixed solar dryer would be better, to be sized according to production. A fixed solar dryer would be better, to be sized according to the production.

One alternative would be to sign an agreement with the landowner for the construction of a fixed dryer, since all the “bagana” stays on the property and the greenhouse structure could be a future asset for the owner.



Industrial treatment and processing phase



Once the straw is dry, the extraction process ends and the agro-industrial treatment and processing begins, which corresponds to the stages of manually and mechanically beating out the ceriferous powder, production of the carnauba raw wax or extraction of the wax with solvent. All the workers involved with powder removal must regard the use of PPEs, especially earmuffs and breathing masks.



Image 48: PPE in the treatment / processing stage. Source: Caatinga Association Collection.



Image 49: Treatment / Processing stage work team. Source: Caatinga Association Collection

Powder beating

There are two forms of dust beating: manual and mechanical. Generally, manual beating, recommended for the “eye” leaf, has lower yield compared to mechanical beating. However, the leaf remains intact and can be used later for making crafts and other products. As for mechanical beating, the straw is shredded and is later used, in most cases, as fertilizer.

The process begins with the “cortador de embira” (fiber-cutterman), who opens the bundles and passes the straw to the “entregador” (deliveryman). During this procedure, as well as material handling, it is very important to pay attention to body posture, to avoid back problems and accidents.

After this first step, the “operador” (operator) inserts the straw into the machine. This is a high-risk procedure and requires utmost attention from the worker. The machines must essentially be equipped with a safety feature that keeps the operator’s hands at a safe distance from the blades.



Images 50 and 51: Fiber-cutterman and deliveryman. Source: Caatinga Association Collection



Image 52: "Espalhador" (spreaderman). Source: Caatinga Association Collection

After being shredded and separated from the ceriferous powder, the straw exits on one side of the machine and is spread by a professional called the “espalhador” (spreaderman), so that it does not accumulate. In this procedure, the spreaderman must keep a safe distance from the machine, so that the mechanical rake does not reach the operator’s body, possibly causing an injury.

! ATTENTION

To ensure the machine does not pose a risk to the worker’s health, some safety conditions must be observed:

- The engine maintenance should always be up to date;
- The straw motor belts must always be covered by metal covers and screens (maximum hole diameter - 1.2 mm);
- The exhaust should be chimney-shaped, preferably with a muffler bracket, so that smoke and soot do not come too close to the workers and the noise does not harm their hearing;
- The machine must work at a maximum of one thousand (1,000) revolutions per minute;
- Work should preferably be performed in the less heated hours of the day: from 5am to 10am;

The “big worm” or the machine bag - where the powder, with the aid of the pressurized air, is separated from the straw - must be made of flannel, a fabric that filters wind air and keeps powder from escaping, thereby improving productivity.

Powder storage and transportation

After removal, the powder is usually placed in 25-30 kg cloth bags and properly stored until it is loaded and transported to the destination company. It is important guarantee the bags used are new and clean. Reusing fertilizer or pesticides bags can contaminate and damage the powder.

Wax production

The step after the powder transportation is the wax production. The production of the raw wax can be seen as a semi-industrial or even artisanal activity, which comprises the processes of melting or cooking the ceriferous powder with water, pressing, filtering, re-cooking, solidifying, breaking and packaging (D'ALVA, 2004).

This process is generally carried out in refineries, and most of the producers deliver the powder to these companies. However, it is still possible to find some producers who prefer to produce and sell the wax to the refineries instead of the powder, as they usually have in their small rural properties a place for its artisanal production.



Wax quality - Industrialization, composition and product specifications

Reviewing the processes:

After the leaves dry under the sun or in managed greenhouses, the coating wax is separated by a beat and friction process on the leaves. Depending on the type of leaf, two types of ceriferous powder are obtained: straw powder and “eye” powder. The straw ceriferous powder obtained from the open leaves produces a greenish brown wax (varying from green to dark brown), while the wax obtained from the unopened leaves (the “eye”) produces a light yellow to greenish yellow wax.

The carnauba wax industrial processing production line is involves extraction and refining.

During extraction, the wax is produced by using the ceriferous powder, sludge or filtered clay (residue of the filtering process) with water or an organic solvent to produce the “eye” wax and straw (also known as “fatty” or “sandy”) wax. The residues from the extraction process (“bagana”) are commercialized as fertilizer. During refining, the wax undergoes hot filter press filtration processes with the addition of a filtering agent and a hydrogen peroxide clarification process. Another option at this stage is

centrifugation. Through this process, the following waxes are produced:

Type 1: yellow (powder from the “eye”);

Type 3: yellow / orange;

Type 4: Filtered - brown;

Type 4: centrifuged - dark brown (from straw powder). Both with its characteristic aroma.

The wax residues trapped in the filter, in the form of filter-clay, return to the extraction section.

The wax may be broken into blocks / slices, through a specific machine, or atomized into spherical granules and finally packaged in 25 kg bags.

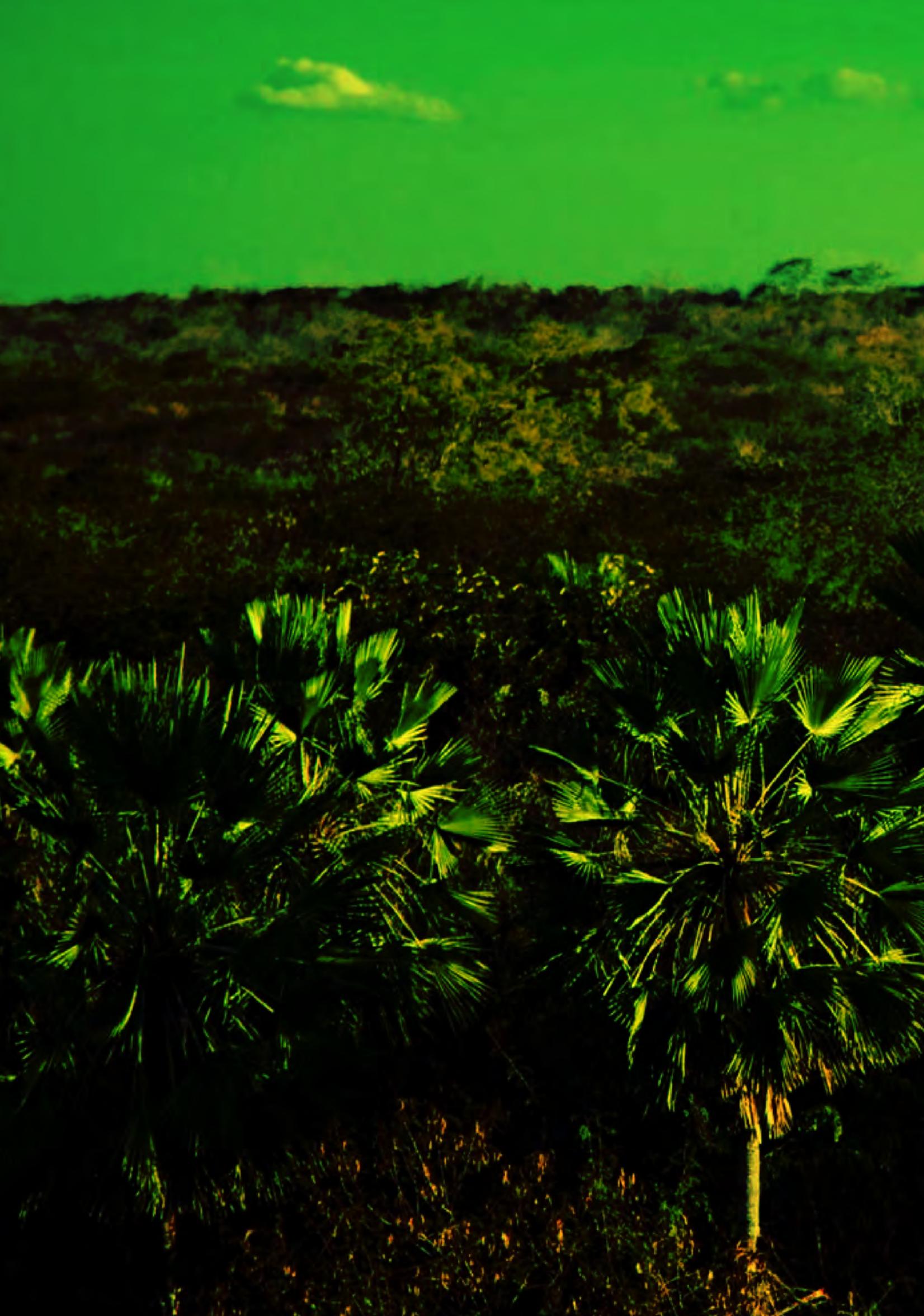
The physicochemical characteristics of the carnauba wax from “eye” powder are different from the wax extracted from straw powder (Table 7). This is because chlorophyll and xantonyl are dissolved in the ceriferous product. In “eye” wax, the percentage of chlorophyll is lower than in straw wax, hence the white color of the “eye” wax, which will produce a lighter-colored wax than the wax extracted from “non-eye” straw, which will produce a darker-colored wax.

The waxes obtained in this process feature the highest hardness and melting point (80 - 86 °C) standards, and are compatible to almost all natural or synthetic waxes and resins. Because of this feature, this process is preferably used to increase the consistency of other excipients, for instance, those utilized in the preparation of medicated pencils, for use in skin or mucous membranes.

Tabela 9: Specific characteristics of each type of refined carnauba wax with their respective classification standards. Source: Pontes Ind. de Cera.

SPECIFICATIONS	TYPE 1	TYPE 3	TYPE 4F	TYPE 4C
Source	“Eye” powder	Straw powder	Straw powder	Straw powder
Moisture	0,5% max.	0,5% max.	0,5% max.	1,0% max.
Saponification Index	78-95mg	78-95mg	78-95mg	78-95mg
Acidity level	02-07mg	02-07mg	02-07mg	02-07mg
Fusion index	80-86°C	80-86°C	80-86°C	80-86°C
Volatile material	0,6% max.	1,0% max.	1,0% max.	1,3% max.
Ester Index	75-88mg	75-88mg	71-88mg	71-88mg
Ignition residue	0,25% max.	0,25% max.	0,25% máx.	-
Heavy metals	20 ppm max.	20 ppm max.	20 ppm max.	20 ppm max.
Color	Yellow	Yellow Orange	Brown	Dark brown

Source: Pontes Ind. de cera.



CHAPTER 6

CARNAUBA PRODUCTIVE CHAIN TRACEABILITY



Proposed traceability model for the carnauba chain

Traceability is the ability to trace products through specific steps from collection, primary processing, consolidation, industrial processing, distribution and commercialization through wholesale and / or retail. A traceability system uses records of information and documents to identify the entire product throughout the supply chain, as well as the management and the operations through which the product has been submitted, from the producer to the final consumer.

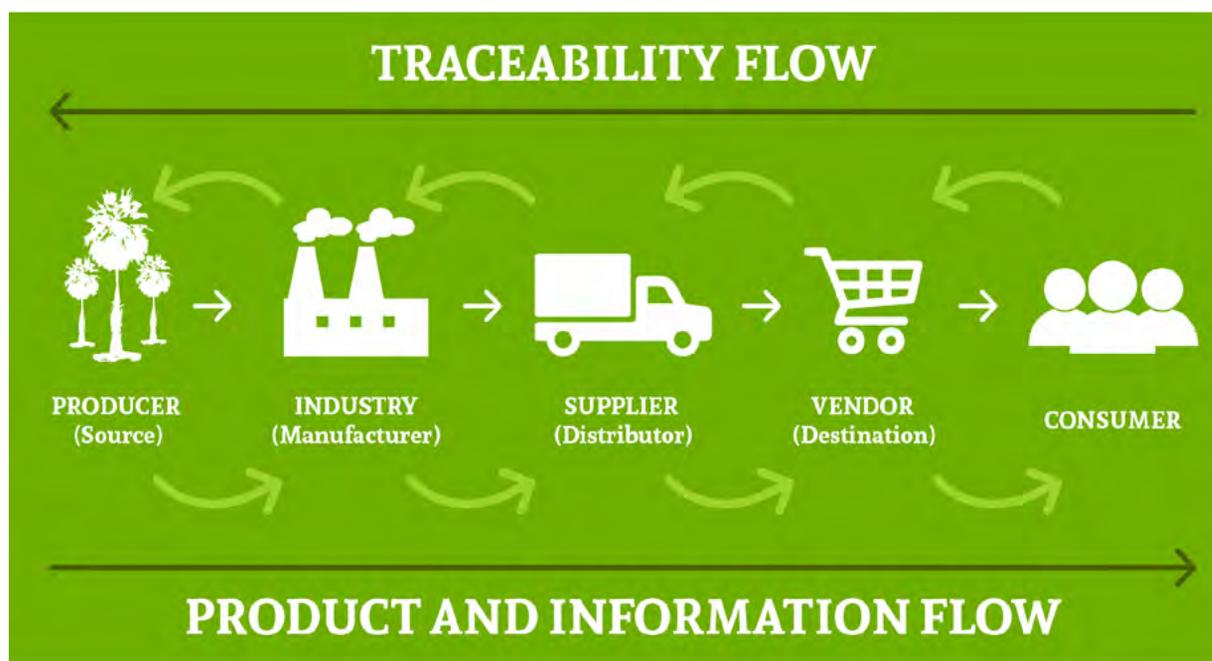


Image 53: Product and information flow in the traceability process

In the case of the carnauba productive chain it is essential that each one of its participants ensure traceability at all stages under their responsibility. Therefore, each actor involved in the supply chain needs to ensure the quality and accuracy of information within their own operations to consolidate a robust traceability system.

An efficient traceability system can safely deliver the following benefits:

- Provide transparency about the production process to all the operators in the chain;
- Ensure efficient identification of the batches that do not comply with technical and / or environmental standards;
- Identify sources and destinations of raw materials and finished products;
- Expand control over volumes purchased, processed and sold;
- Develop indicators for monitoring the quality of the production;
- Outline responsibilities in the production / distribution process;
- Facilitate information retrieval in quality management audits;
- Meet current or future government requirements;
- Improve planning to optimize the use of raw materials for each product type;
- Create awareness about all the actors involved in the carnauba supply chain;
- Add value to the product.

Participating actors in the traceability system

- a) **Regulators:** Regulators are governmental and non-governmental organizations that define rules, standards and laws to be followed and observed regarding the definitions, needs and requirements of the traceability process. These organizations establish maximum product residue limits, grace periods, best production practices that must be observed and followed, among other topics. Examples: Anvisa, INMETRO, FDA.
- b) **Facilitators:** Facilitators participate in the traceability process by offering services and products that support the standards set by the regulators. Example: Developers of traceability software.
- c) **Certifiers:** Certifying agents aim to confirm that the actors in the productive chain comply with government requirements and monitor their production practices in a traceability system, according to the criteria established by the certification.
- d) **Consumer:** The consumer is the ultimate beneficiary of the traceability process via access to the product origin and its production processes throughout the entire product chain. There is an increasing demand from consumers worldwide for information about the social and environmental standards adopted in the various production stages.
- e) **Productive chain:** The productive chain is the system that extends all the way from the rural producer, through the consolidator (middleman), processor, and distributor, until the final consumer.

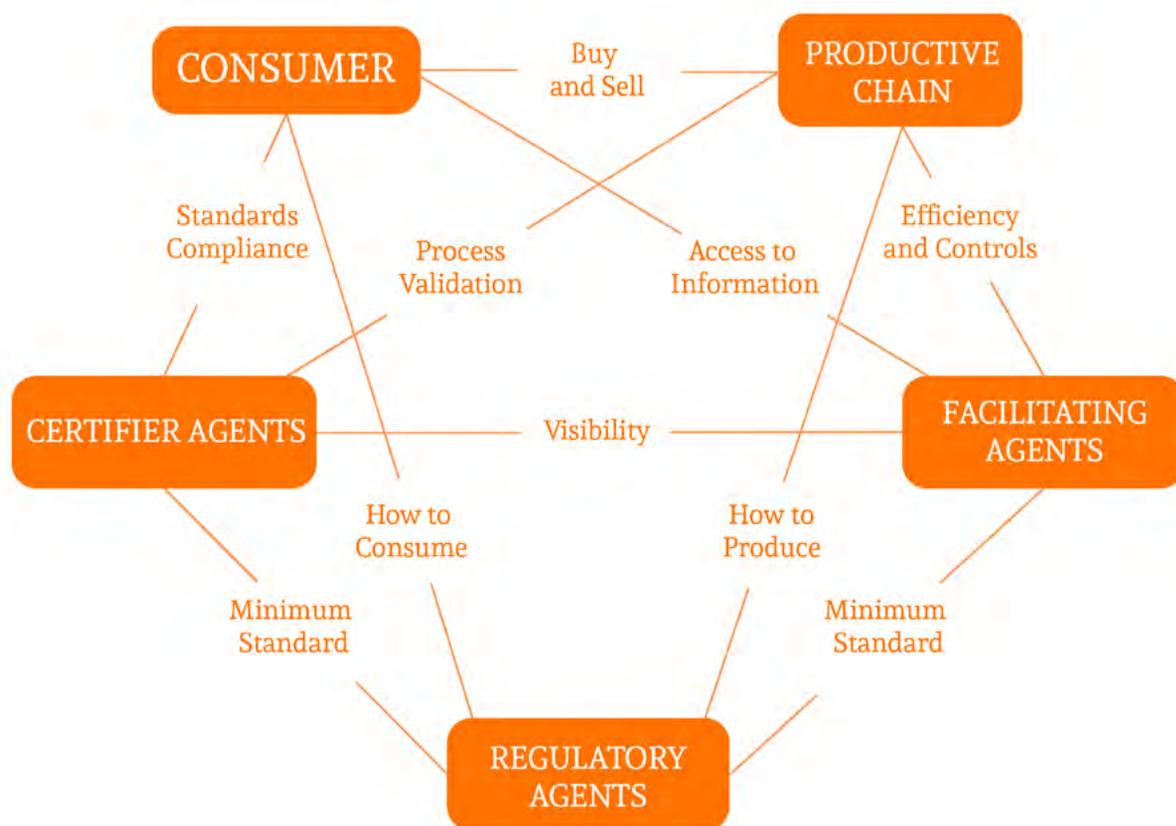


Image 54 – Actors in the traceability process

Traceability Certification

The certification process is a form of assurance provided by a Third Party (entity not directly involved with the actors and recognized by the regulators to provide such certification services) that a process, product or service is being performed in a consistent manner, according to the pre-established parameters.

Prior to formal certification, there are simpler and cheaper options for public acknowledgment of the quality of a product or service process. These validations do not offer the best guarantees of a certification, but are quite common.

There are different ways to ensure traceability (combinations are possible):

1. Self-declaration;
2. Internal Supplier Audits;
3. Independent audits (audits at each stage of the supply chain);
4. Independent audits using a defined traceability platform.

Key traceability levels for sustainable certification systems

1. **Preserved Identity (IP):** means that the ingredient can be traced back to the specific producer / collector where the carnauba was collected.

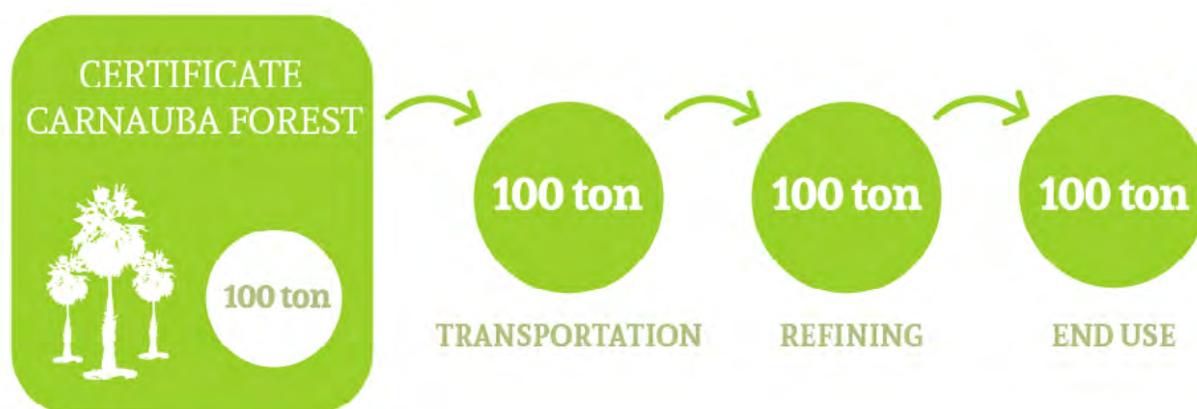


Image 55: Preserved Identity (IP) traceability level.

2. **Segregation:** means that ingredients with certain features (e.g.: certified features) are kept separate from other ingredients that do not have the same features. This allows the mixing of carnauba from different producers that are part, for example, of a specific certification framework.

3. **Mass balance:** means that certified ingredients can be mixed with non-certified ingredients in the supply chain.



Image 56: Segregation traceability level.

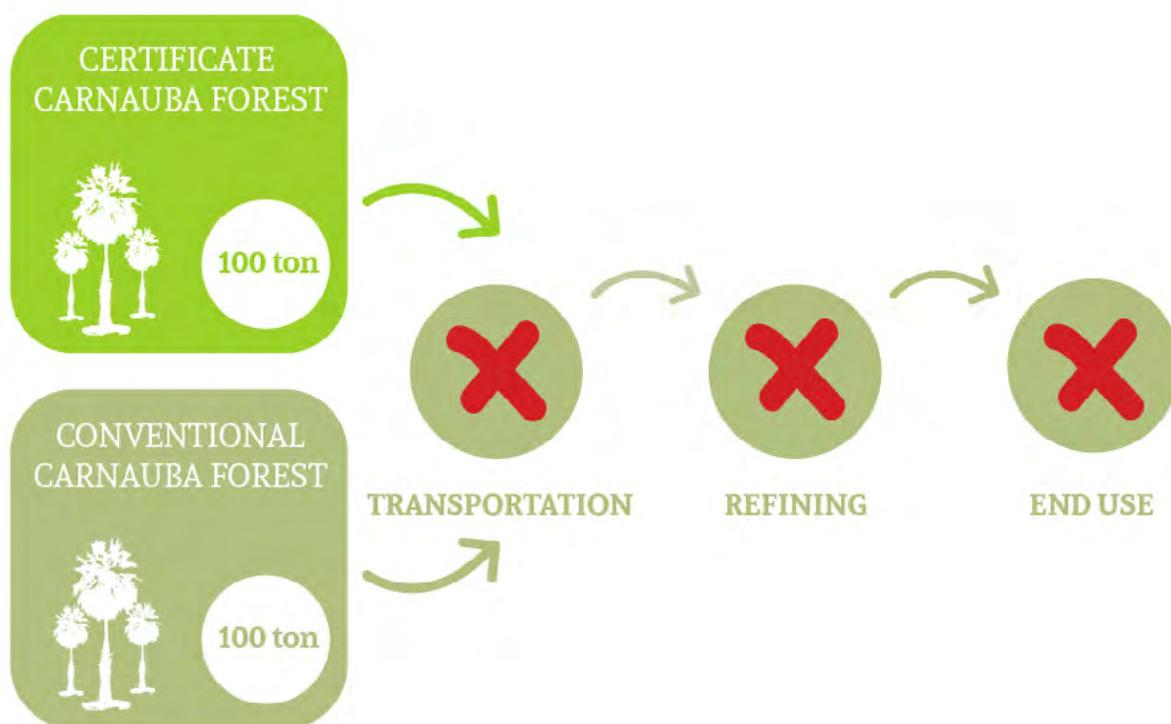


Image 57: Mass balance traceability level.

Accountabilities in the carnauba traceability system

For improvement of the carnauba chain, it is essential to implement an efficient traceability system that ensures the supply of quality information throughout the links involved in the production chain. For this to occur, it is important for producers, intermediaries, industries, importers, distributors and consumers to understand the importance of cooperative and interdependent relationships with the quality and truthfulness of shared information.

Implementing a traceability system not only means complying with legal requirements regarding socio-environmental or technical standards related to production quality, but being able to provide accurate product-associated information at each stage of processing to all stakeholders.

Thus, the following topics are recommended for the actors in the carnauba production chain:

1. Have a documented overview of the traceability system, which describes the production, transformation, storage procedures and the entire record keeping process and the traceability level applied at each step of the chain;
2. Formally appoint the personnel responsible for ensuring correct implementation of the traceability system;
3. Develop a critical-points control plan to ensure traceability of identified ingredients for each one of the supply chains;
4. Establish policies and / or procedures to assess the compliance with traceability requirements to each one of the critical control points;
5. Have a product identification system (coding / batching system) in which ingredients can be traced back to the producer / supplier;
6. Keep evidence and relate the produced batches with the collectors participating in the activity;
7. Keep records of sales / purchasing documents related to the traced ingredients for at least 5 years;
8. If ingredients are processed / transformed in any way that affects the volumes, information on conversion rates and volumes must be available before and after the process has been completed;
9. Distinguish segregation, in an audit-friendly way, from traced and non-traced production.
10. With the batch number, it should be possible to have information on who was involved in the process (collectors and others), when the activities were performed (when the collection took place, for instance).

Proposed traceability model for the carnauba chain:

In summary, the development of a carnauba traceability system should afford the identification of all product batches and their relationship with the collection areas and collectors involved, as well as primary processing and consolidations along the production chain.

It should also incorporate all relevant records related to the social and environmental aspects of the chain (property location, collection data, manpower data, among others). To this end, the carnauba traceability model in the ANNEXES is recommended, so that it can be incorporated by the main links in the production chain.



**THE FORM TEMPLATES ARE IN
ANNEX 2 AND 3, FOR PRINTING AND /
OR CONSULTATION.**

APPENDIX

Organizations and contacts / service points

Organization	Telephone	Website / Contact email
National		
MMA - Ministry of Environment	+55 (61) 2028-2192	http://www.mma.gov.br/
MAPA - Ministry of Agriculture, Livestock and Supply	+55 (61)3218-2828 0800 704 1995	http://www.agricultura.gov.br/
MPT - Labor Prosecutor	+ 55(61)3314 8500	http://portal.mpt.mp.br https://mpt.mp.br/pgt/fale-com-o-mpt
IBAMA - Brazilian Institute of Environment and Renewable Natural Resources	0800-618080 + 55 (61) 3316-1212	https://www.ibama.gov.br/
ICMBio - Chico Mendes Institute for Biodiversity Conservation	+55 (61) 3341-9101	http://www.icmbio.gov.br/portal/ http://www.icmbio.gov.br/portal/contato
TST - Superior Labor Court	0800 644 3444	https://bit.ly/31BMfMa
Inpacto - National Pact Institute for the Eradication of Slave Labor	+55 (11) 3897-2400	https://bit.ly/2Kz178t
CEARÁ		
ADECE - Ceará State Development Agency	+55 (85) 3457-3300	http://www.adece.ce.gov.br/ adece@adece.ce.gov.br
Carnauba Sector Chamber	+55 (85) 3215.3090 +55 (85) 3457-3336	https://bit.ly/2Mhm5uF cscarnauba@adece.ce.gov.br
SINDCARNAÚBA - Union of Carnauba Wax Refining Industries of the State of Ceará	+55 (85) 4009-6300	http://sindcarnauba.org.br/ sindcarnauba@sfiec.org.br
FAEC - Federation of Agriculture and Livestock in Ceará	0800-618080 +55 (61) 3316-1212	https://www.ibama.gov.br/
FIEC - Federation of Industries of the State of Ceará	+55 (85) 4009-6300	https://www1.sfiec.org.br/
FETRAECE - Federation of Rural Workers, Small Farmers and Family Farmers of the State of Ceará	+55 (85) 3231-5887	http://www.fetraece.org.br/ falecom@fetraece.org.br
CAATINGA ASSOCIATION	+55 (85) 3241-0759	https://www.acaatinga.org.br caatinga@acaatinga.org.br

LABOR PUBLIC PROSECUTION OFFICE	-	prt07.dr@mpt.mp.br
SRTE - Regional Superintendence of Labor and Employment in Ceará	+55 (85) 3255-3950 +55 (85) 3255-3941 +55 (85) 3255-3940	fabio.zech@mte.gov.br jaqueline.guerra@mte.gov.br
PIUAÍ		
SRTE - Regional Superintendence of Labor and Employment in Ceará	+55 (86) 3226-1715 +55 (86) 3222-0001	-
LABOR PUBLIC PROSECUTION OFFICE	+55 (86) 4009-6430 +55 (86) 9544-7871	prt22.cg@mpt.mp.br
FIEPI - Federation of Industries of the State of Piauí	+55 (86) 3218-3231	https://www.fiepi.com.br/ ascom@fiepi.com.br
FETAGPI - Federation of Rural Workers, Small Farmers and Family Farmers of the State of Piauí	+55 (86) 3230-9850	https://www.fetagpi.org.br/ http://webmail.fetagpi.org.br/
FAEPI - Federation of Agriculture and Livestock of Piauí	+55 (86) 3218-6059	https://www.sistemafaepi.org.br/ http://webmail.sistemafaepi.org.br/
Rio Grande do Norte		
SRTE - Regional Superintendence of Labor and Employment in Ceará	+55 (84) 3220-2036 +55 (84) 3220-2000	eder.praxedes@mte.gov.br
LABOR PUBLIC PROSECUTION OFFICE	+55 (84) 4006-2800 +55 (84) 4006-2864	prt21.gabinete@mpt.mp.br
FIERN - Federation of Industries of the State of Rio Grande do Norte	+55 (84) 3204-6150	https://www.fiern.org.br/ https://www.fiern.org.br/contato/
FETARN - Federation of Rural Workers, Small Farmers and Family Farmers of the State of Rio Grande do Norte	+55 (84) 3211-4688	http://www.fetarn.org.br/
FAERN - Federation of Agriculture and Livestock of Rio Grande do Norte	+55 (84) 3611-0441	http://www.senarrn.com.br https://bit.ly/300qTry

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Guia sobre patrimônio genético

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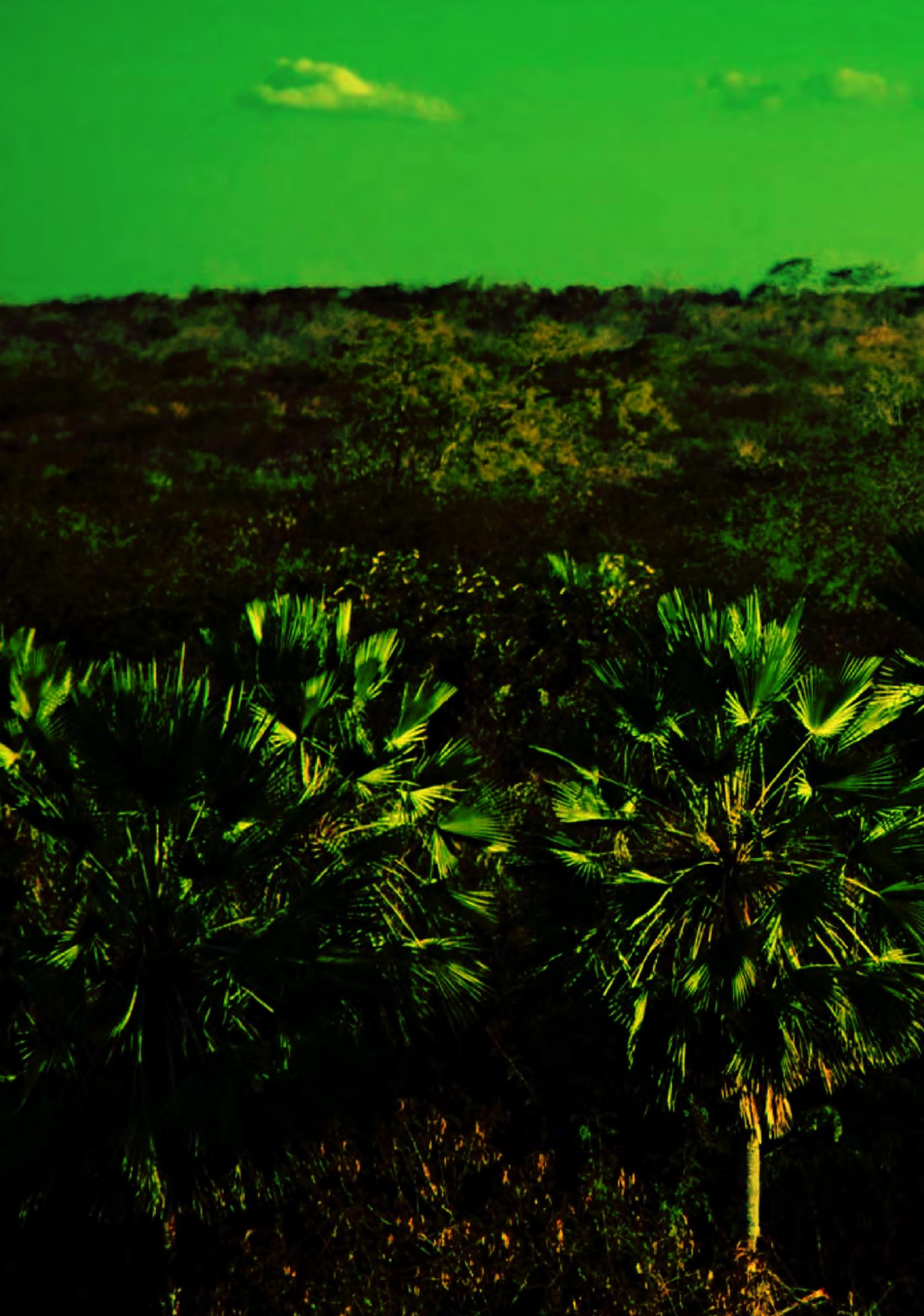
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ANNEX



ANNEX 1

CARNAUBA GROOVE / PRODUCER ID SHEET		
PRODUCER IDENTIFICATION		
Name:		
RG: <small>(Personal ID Number)</small>	CPF: <small>(Individual Taxpayer Number)</small>	DAP (if applicable): <small>PRONAF Statement of Aptitude</small>
Phone number: ()		E-mail:
Carnauba groove Identification:		
City / State:		Location:
Land legal situation of the collecting area:	Possession: () Possessor's name _____ Small Rural Property: () Owner's name: _____ Rural Settlement: () Name of the settlement: _____	
Land Use Agreement: Leasing () Sharecropper () Collective / Family Production ()	Is the carnauba groove near any Conservation Unit (reserve, park, ecological station)? Yes () No () If so, which one? _____	
Owner's name:		
Owner's Contact data: ()	Size of management area in hectares:	
Estimated amount of productive carnauba palm trees:	Estimated amount of straw (in thousands) in the carnauba groove:	
Amount of powder per thousand units of straw (Kg) "Eye" Powder _____(Kg) Median powder _____(Kg) Other _____(Kg)	Amount of total carnauba groove powder (Kg): "Eye" Powder _____(Kg) Median powder _____(Kg) Other _____(Kg)	
Amount of carnauba groove wax, if applicable (Kg) Wax Type _____/_____(Kg) Wax Type _____/_____(Kg) Wax Type _____/_____(Kg)	Are there access roads and trails to the collection areas? Yes () No () If so, how many? _____	

<p>Are there waterways (streams, rivers, lakes or ponds, water springs) on the property?</p> <p>Yes () No ()</p> <p>If so, which type? _____</p>	<p>Carnauba groove access and cleaning</p> <p>() Good access</p> <p>() Acceptable access</p> <p>() Difficult access</p>			
<p>() Yes () No</p> <p>If yes, answer below</p> <p>Is the carnauba groove infested by the devil's claw?</p> <p>() Infestation in up to 10% of the carnauba groove</p> <p>() Infestation in up to 20% of the carnauba groove</p> <p>() Infestation in up to 50% of the carnauba groove</p> <p>() Infestation in up to 75% of the carnauba groove</p> <p>() Infestation over 100% of the carnauba groove</p>				
<p>Predominant carnauba groove height:</p> <p>() Short</p> <p>() Medium</p> <p>() Tall</p>	<p>Carnauba groove spacing:</p> <p>() Close</p> <p>() Spaced</p>	<p>Carnauba groove maturity:</p> <p>() Green</p> <p>() Mature</p>	<p>The carnauba groove is:</p> <p>() Native</p> <p>() Planted</p>	<p>A área é de uso:</p> <p>() Collective use</p> <p>() Individual use</p>
<p>Is there herd activity (cattle, goat or sheep) in the collection areas?</p> <p>Yes () No ()</p> <p>If so, which type? _____</p>	<p>Are chemical products used in the collection and surrounding area (pesticides)?</p> <p>Yes () No ()</p>			
<p>() Yes</p> <p>Document ID: _____</p> <p>Does the property have a Rural Environmental Registry (CAR)?</p> <p>() No</p> <p>Property reference point: _____</p> <p>Property GPS coordinate: _____</p>				

ANNEX 2

PRODUCER SHEET

Product information:

Plant product name:

Type of raw material: () “eye” wax, () “fatty” wax, () “sandy” wax,
() “eye” powder, () straw powder, () sludge.

Amount of product produced (Kg):

Batch ID:

Date of batch completion:

Producer Information:

Name or Company Name:

CPF, IE (State Tax Register) or CNPJ (Corporate Taxpayer Number):

Full address, geographic coordinates or Rural Property Register Certificate (CCIR) of the property:

Telephone:

Land Lease Document:

Collectors' Information:

List with full names:

Copy of CPF (Individual Taxpayer Number) and / or ID card:

Copy of receipts for workers' tax payment and compensation:

ANNEX 3

CONSOLIDATOR / MIDDLEMAN SHEET

Product information:

Plant product name:

Type of raw material: () “eye” wax, () “fatty” wax, () “sandy” wax, () “eye” powder, () straw powder, () sludge

Amount of product produced (Kg):

Identification of source batch(es):

Producer Information:

Name or Company Name:

CPF, IE (State Tax Register) or CNPJ (Corporate Taxpayer Number):

Full address, geographic coordinates or Rural Property Register Certificate (CCIR) of the property:

Telephone:

Land Lease Document:

Collectors' Information:

List with full names:

Copy of CPF (Individual Taxpayer Number) and / or ID card:

Copy of receipts for workers' tax payment and compensation:

Consolidator / Middleman Information:

Name or Company Name:

CPF, IE (State Tax Register) or CNPJ (Corporate Taxpayer Number):

Full address:

Telephone:

Identification of source batch(es):

Consolidated Batch ID:

Consolidated batch volume (Kg):

Batch consolidation date:

ANNEX 4

INDUSTRY

Product information:

Plant product name:

Type of raw material: () “eye” wax, () “fatty” wax, () “sandy” wax, () “eye” powder, () straw powder, () sludge

Amount of product produced (Kg):

Identification of source batch(es):

Producer Information:

Name or Company Name:

CPF, IE (State Tax Register) or CNPJ (Corporate Taxpayer Number):

Full address, geographic coordinates or Rural Property Register Certificate (CCIR) of the property:

Telephone:

Land Lease Document:

Information about the collectors:

List with full names:

Copy of CPF (Individual Taxpayer Number) and / or ID card:

Copy of receipts for workers’ tax payment and compensation:

Consolidator / Middleman Information:

Name or Company Name:

CPF, IE (State Tax Register) or CNPJ (Corporate Taxpayer Number):

Full address:

Telephone:

Identification of source batch(es):

Consolidated Batch ID:

Consolidated batch volume (Kg):

Batch consolidation date:

Processing Information:

Name or Company Name:

CNPJ (Corporate Taxpayer Number):

Full address:

Telephone:

Consolidated batch ID:

Consolidated product x processed product conversion rate:

Processed product volume (Kg):

Processed product classification: () Type 1, () Type 2, Type 4 ()

Processing date:



CARRIED OUT BY



On behalf of:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany

Implemented by:



Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

MINISTRY OF
AGRICULTURE, LIVESTOCK
AND FOOD SUPPLY

